

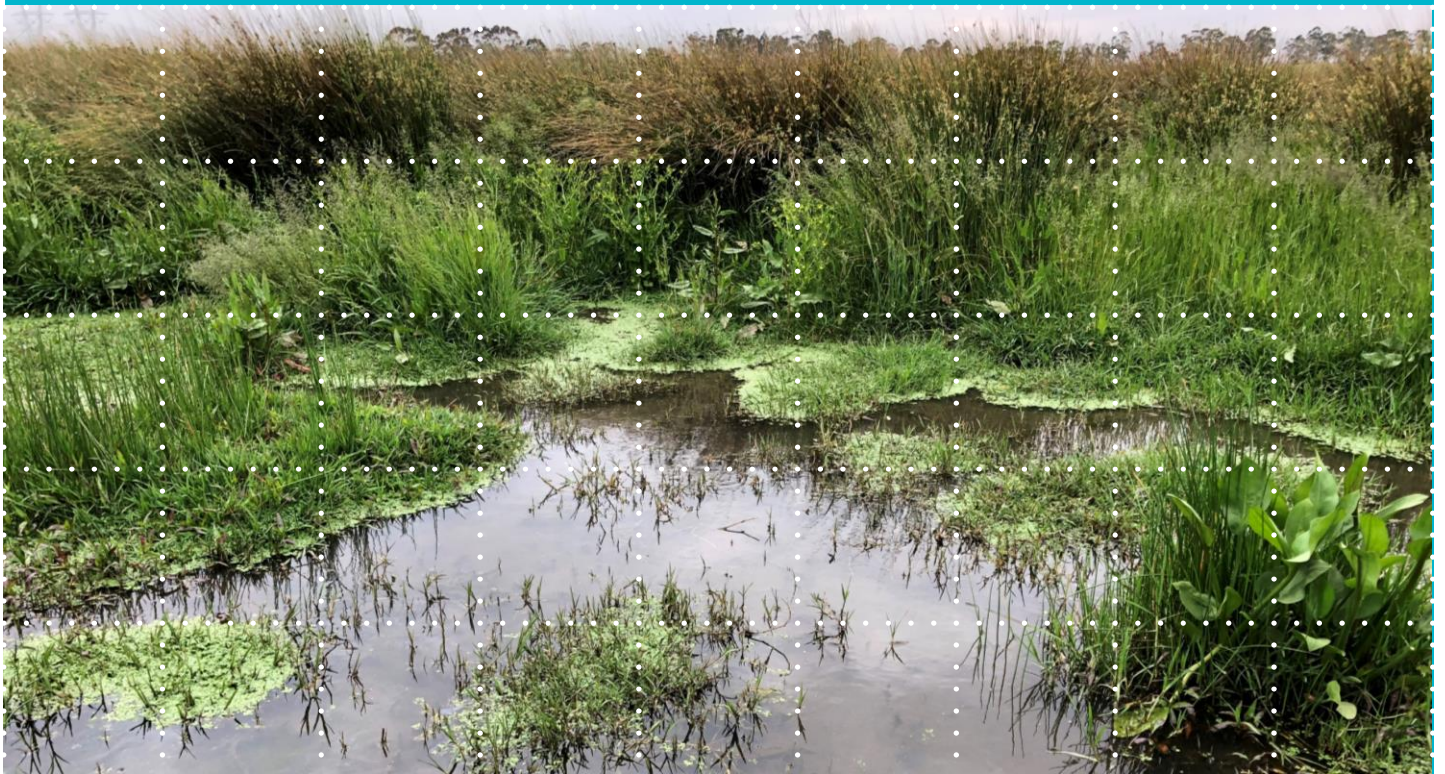
Final Report

Environmental Management Plan for the proposed Cardinia Motorsport, Recreation and Education complex: 21, 75 and 115 Key Lane and 335 McGregor Road, Pakenham, Victoria

Prepared for

Podium 1

August 2019



Ecology and Heritage Partners Pty Ltd

DOCUMENT CONTROL

Assessment	Environmental Management Plan
Address	21, 75 and 115 Key Lane and 335 McGregor Road, Pakenham, Victoria
Project number	11399
Project manager	Claire Ranyard (Consultant Botanist)
Report reviewer	Aaron Organ (Director/Principal Ecologist)
Other EHP staff	Andrea Fullagar (Zoologist); Jeremy Coyne (Zoologist)
Mapping	Monique Elsley (GIS Officer); Petra Sorensen (GIS Officer)
File name	11399_EHP_EMP_CardiniaMotorPark_Final_01082019
Client	Podium 1
Bioregion	Gippsland Plain
CMA	Port Phillip and Westernport
Council	Cardinia City Council

Report versions	Comments	Comments updated by	Date submitted
Draft 1			23/07/2019
Final 1	Comments received from SJB Planning/Podium 1	CR	05/08/2019

Acknowledgements

We thank the following people for their contribution to the project:

- Felicity Richardson and Kim Mulcahy (Podium 1) for project and site information
- Landowners for site access

Copyright © Ecology and Heritage Partners Pty Ltd

This document is subject to copyright and may only be used for the purposes for which it was commissioned. The use or copying of this document in whole or part without the permission of Ecology and Heritage Partners Pty Ltd is an infringement of copyright.

Disclaimer

Although Ecology and Heritage Partners Pty Ltd have taken all the necessary steps to ensure that an accurate document has been prepared, the company accepts no liability for any damages or loss incurred as a result of reliance placed upon the report and its contents.

GLOSSARY

Acronym	Description
AVW	Atlas of Victorian Wildlife
CaLP	<i>Catchment and Land Protection Act 1994</i>
CBD	Central Business District
CMA	Catchment Management Authority
DBH	Diameter at Breast Height
DELWP	Victorian Department of Environment, Land, Water and Planning
DoEE	Federal Department of the Environment and Energy
EES	Environment Effects Statement
EMP	Environment Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVC	Ecological Vegetation Class
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
GGF	Growling Grass Frog
HabHa	Habitat Hectare
LOT	Large Old Tree
NES	National Environmental Significance
NVIM Tool	Native Vegetation Information Management Tool (DELWP)
PMST	Protected Matters Search Tool (DoE)
SBB	Southern Brown Bandicoot
TRZ	Tree Retention Zone
VBA	Victorian Biodiversity Atlas (DELWP)

CONTENTS

1	INTRODUCTION	7
1.1	Background	7
1.2	Objectives of this EMP	7
1.3	Study Area.....	8
1.4	Limitations	9
2	EXISTING ENVIRONMENTAL VALUES.....	10
2.1	Vegetation Condition	10
2.2	Fauna Habitat.....	10
2.2.1	Exotic grassland.....	10
2.2.2	Drainage line and adjoining Plains Grassy Wetland	11
2.2.3	Farm Dams	11
2.2.4	Scattered/planted trees	11
2.2.5	Toomuc Creek	11
3	ENVIRONMENTAL MANAGEMENT PLAN	12
3.1	Impacts on Existing Flora and Fauna.....	12
3.1.1	Impacted vegetation	12
3.1.2	Mitigation to native vegetation.....	12
3.1.3	Pre-construction	13
3.1.4	During Construction	14
3.1.5	Monitoring and reporting	15
3.2	Plant Disease and Pest Plant Management.....	15
3.2.1	Pre-construction	15
3.2.2	During Construction	16
3.2.3	Post-construction.....	16
3.2.4	Monitoring and reporting	18
3.3	Impacts to Native Fauna	18
3.3.1	Native Fauna Salvage and Management.....	19
3.3.2	Pre-construction	19
3.3.3	During Construction.....	19
3.3.4	Post-construction.....	22
3.3.5	Monitoring and reporting	23
3.4	Pest Animal Management.....	23

3.4.1	Pre-construction	23
3.4.2	During Construction.....	24
3.4.3	Post-Construction	24
3.4.4	Monitoring and reporting	25
3.5	Retained Vegetation and Revegetation Methods	26
3.6	Management of Impacts on Creek Lines.....	26
4	GROWLING GRASS FROG MANAGEMENT PLAN.....	27
4.1	Conservation Status	27
4.2	Habitat Requirements.....	27
4.3	Threatening Processes	28
4.4	Occurrence of the Species within the Study Area.....	28
4.5	Implementation, Timeframe and Review.....	29
4.6	Pre-Development Phase	29
4.6.1	Staging of Proposed Works	29
4.6.2	Design Considerations: GGF Wetlands.....	30
4.6.3	Design Considerations: Waterway Re-alignment.....	33
4.6.4	Monitoring	33
4.7	Development Phase	34
4.7.1	Waterway and Dam Removal.....	34
4.7.2	Frog Salvage and Translocation.....	34
4.7.3	Fencing.....	35
4.7.4	Signage.....	36
4.8	Post-Development Phase: Ongoing Management and Monitoring	36
4.8.1	Water Quality.....	36
4.8.2	Management and Maintenance.....	37
5	MITIGATING OTHER ENVIRONMENTAL IMPACTS	39
5.1	Environmental Site Induction.....	39
5.1.1	Pre-construction	39
5.1.2	Monitoring and reporting	40
5.2	Erosion and Sedimentation.....	40
5.2.1	Monitoring and reporting	40
5.3	Dust.....	40
5.3.1	Monitoring and reporting	41
5.4	Vehicle Access and Transport of Materials	41

5.4.1	Monitoring and reporting	42
5.5	Chemical Storage and Operational Failure.....	42
5.5.1	Monitoring and reporting	42
5.6	Waste Management	43
5.6.1	Monitoring and reporting	43
5.7	Fire Management and Emergency Procedures.....	43
5.7.1	Monitoring and reporting	44
5.8	Noise Management.....	44
5.9	Incidents and Complaints.....	44
6	MONITORING, AUDITING, ADAPTIVE MANAGEMENT AND REPORTING.....	45
6.1	Monitoring responsibility.....	45
6.2	Auditing.....	45
6.3	Adaptive Management	45
6.4	Reporting	45
7	RESPONSIBILITIES FOR MANAGEMENT	47
	REFERENCES	48
	FIGURES	50
	APPENDICES	54
	Appendix 1 – Standard Procedures for the capture and release of birds, mammals, reptiles, frogs	55
	Appendix 2 – Suitable EVCs for revegetation.....	58
	Appendix 3 – Example of Schematics for Growling Grass Frog Habitat Creation.....	59

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was engaged by Podium 1 to prepare an Environmental Management Plan (EMP) for 21, 75 and 115 Key Lane, and 335 McGregor Road, Pakenham, Victoria (the study area; Figure 1). The preparation of an EMP is a requirement of the Development Plan Overlay – Schedule 16 (DPO16) of the Cardinia Shire Planning Scheme, which applies to the study area.

The EMP will detail the potential environmental impacts of any proposed development and the ways in which these impacts may be reduced through management strategies and site practices. A key focus of this Environmental Management Plan will be on Growling Grass Frog (GGF) *Litoria raniformis*, a species of national significance known to occur in the region where the development is proposed. The Victorian Biodiversity Atlas (VBA) (DEWLP 2018a) lists numerous records of GGF within a 10-kilometre radius of the study area (Figure 4).

A recent detailed flora and fauna survey was undertaken within the study area by Ecology and Heritage Partners (2019), which identified areas of suitable habitat for GGF. Targeted surveys were conducted for GGF within the study area, with no individuals recorded during the surveys, however suitable habitat was identified and a population of GGF was recorded within close proximity to the study area, to the north and south.

1.2 Objectives of this EMP

In accordance with the Development Plan Overlay – Schedule 16 (DPO16), the objectives of this Environmental Management Plan are to:

- Describe the impact on flora and fauna from the proposed development, including avoidance and mitigation measures (Section 3.1 – 3.4);
- Identify areas of retained native vegetation and fauna habitat, and areas which will be revegetated, including a list of appropriate species for revegetation (Figure 3; Appendix 2 and 4);
- Avoidance and mitigation of impacts to the nationally significant GGF, including a Growling Grass Frog Management Plan (Section 4), which will incorporate:
 - A review of the relevant data on the Victorian Biodiversity Atlas (VBA), and available literature in relation to the occurrence of the GGF and available habitats immediately surrounding the study area;
 - Determine what management actions are required to complete the proposed infrastructure in the vicinity of the study area without negatively impacting resident GGF populations;
 - Provide a map showing the extent of current GGF populations within the local area;
 - Provide detailed management and habitat design measures relating to all stages of construction (pre, during and post construction).

- Management of impacts on creek lines and surrounding environment (Section 3.1.2 and 3.6);
- Description of management of impacts during construction, including erosion and sediment, dust, noise, litter and traffic (Section 5).
- Include an outline of the overall objectives, discuss the relevant timeframes, and provide a list of the organisations responsible for implementation of the plan (Section 6 and 7);

In addition to the DPO16, this EMP and the associated management actions have been prepared in reference to the following environmental legislation and policies:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act);
- Victorian *Planning and Environment Act 1987*;
- Victorian *Catchment and Land Protection Act 1994* (CaLP Act);
- Victorian *Wildlife Act 1975*; and,
- Environment Protection Authority (EPA) State Environmental Planning Policies (SEPPs).

1.3 Study Area

The study area is located at 21, 75 and 115 Key Lane and 335 McGregor Road, Pakenham, Victoria, approximately 60 kilometres south-east of Melbourne's CBD (Figure 1). The study area is directly adjacent to, but outside of the Melbourne Strategic Assessment Area. The study area covers approximately 128 hectares and is bound by Key Lane to the north, McGregor Road to the east, and private agricultural land to the south and west.

The land within and surrounding the study area predominantly supports agricultural and recreational activities, in the form of grazing and motorbike trails. The study area contains a gradual slope from north-east to south-west. Toomuc Creek, eight artificial dams and a drainage line are present within the study area.

The study area is mapped as supporting three patches of Plains Grassy Wetland (EVC 125), which occur around the McGregor Road drain running north to south through the study area, and three patches of Swampy Riparian Woodland (EVC 83) present along Toomuc Creek. Six scattered trees are also present. The McGregor Road drainage line and the two western dams present within the study area were identified as suitable habitat to support the nationally significant GGF, and potential habitat for Southern Brown Bandicoot was identified along the banks of Toomuc Creek and the surrounding vegetation (Ecology and Heritage Partners 2019). Further details regarding the existing environmental values are given in Section 1.4.

According to the Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) Tool (DELWP 2019), the study area occurs within the Gippsland Plain bioregion. It is located within the jurisdiction of the Port Phillip and Westernport Catchment Management Authority (CMA) and the Cardinia City Council municipality.

In addition, the study area is covered by a Development Plan Overlay – Schedule 16 (DPO16), which specifies the requirement for an Environmental Management Plan.

1.4 Limitations

This EMP does not include details of public safety, site security, operating hours, waste management, construction program, traffic management, evidence of relevant authority approvals and insurance or asset condition reports. Further, the EMP does not include a water sensitive urban design or a Landscape Plan detailing management guidelines for the implementation and location of property fence design, batter slopes, and other landscape works including cut and fill. This should be developed by the construction contractor with the aid of landscape and design plans for the works proposed on-site.

In addition, the GGF section (Section 4) of this EMP has been prepared to address the items contained within the Development Plan Overlay (DPO16) that applies to the study area. Further consideration of future strategic connectivity and future conservation for the species may be required, and as such, ongoing discussions with Council and DELWP is encouraged.

2 EXISTING ENVIRONMENTAL VALUES

2.1 Vegetation Condition

Native vegetation within the study area was predominately confined to areas around the McGregor Road drain and Toomuc Creek, and within three of the farm dams present.

Patches of Plains Grassy Wetland (EVC 125) vegetation surrounded the McGregor Road drain, in areas adjacent to the creek and where the water overflows during wetter periods. These areas were dominated by Tall Rush *Juncus procerus*, with several semi-aquatic herbs scattered amongst the Tall Rush, including Swamp Lily *Ottelia ovalifolia*, Slender Knotweed *Persicaria decipiens*, Common Spike-sedge *Eleocharis acuta*, Water Ribbons *Cyanogeton procerum* and Soft Crane's-bill *Geranium potentilloides*.

Within the three dams that contained native vegetation, the most common species were Curly Pondweed *Potamogeton crispus*, Swamp Lily and Water Plantain *Alisma plantago-aquatica*. The remaining dams were devoid of native vegetation and were located in disturbed areas where grazing occurred.

Swampy Riparian Woodland (EVC 83) was present along the banks of Toomuc Creek. These patches were characterised by a sub-canopy of Silver Wattle *Acacia dealbata* with a highly modified understory. Native diversity in the understory was limited to a few species, primarily Swamp Paperback *Melaleuca ericifolia*, Variable Groundsel *Senecio pinnatifolius* and Kidney-weed *Dichondra repens*.

Large sections of the study area have been subject to disturbance through agricultural land use, primarily grazing. These areas were devoid of native vegetation and were dominated by exotic pasture grasses and herbs, including Yorkshire Fog *Holcus lanatus*, Annual Meadow-grass *Poa annua*, Slender Bird's-foot Trefoil *Lotus angustissimus*, Cocksfoot *Dactylis glomerata* and Onion-grass *Romulea rosea*.

2.2 Fauna Habitat

Five broad habitat types are present within the study area; exotic grassland, drainage lines, farm dams, scattered/planted trees and Toomuc Creek. In a broader context, the habitat within the study area is relatively isolated from surrounding areas of remnant vegetation. The habitat corridors present include Toomuc Creek, which forms a narrow linear reserve running north to south, and the McGregor Road drain.

A description of each habitat type identified within the study area and the species likely to occur within them is given below.

2.2.1 Exotic grassland

Introduced, modified grassland is the dominant fauna habitat present within the study area, occurring primarily within the eastern and north western section of the site. This habitat occurs where native vegetation has been cleared or modified as a result of agricultural practices. Introduced grassland supports relatively few fauna species, none of which are dependent on such habitat. Given the extent of the modification of grassland habitat within the study area, and the number of introduced species, the value of this habitat for native fauna within the study area is generally low.

2.2.2 Drainage line and adjoining Plains Grassy Wetland

There is one main drainage line that runs north to south across the study area, McGregor Road drain, which has a few smaller offshoots. This drainage line has been impacted by cattle, which has broadened a section and created an ephemeral wetland area. Water quality appears moderate, being relatively clear and slow flowing throughout the site, however it has been prone to disturbance through pugging due to the presence of cattle. Cattle were removed from the property in October 2018.

This drainage line provides habitat for Latham's Snipe, which was observed in the wetland during the field assessment and is likely used as a habitat corridor for GGF, which has been previously recorded within this area (Ecology Partners 2010). A variety of common frogs and birds, such as Common Eastern Froglet *Crinia signifera*, Verreaux's Frog *Litoria verreauxii*, Superb Fairy Wren *Malurus cyaneus* and White-faced Heron *Egretta novaehollandiae*, were recorded during the field assessment.

2.2.3 Farm Dams

There are eight artificial dams present within the study area (Figure 2). All were holding water during the time of assessment. Of the dams present, six located within the eastern section of the study area were highly impacted by cattle and contained little to no fringing vegetation. Exotic grasses present within modified paddocks surrounded these six dams.

Two of the dams located in the western side of the study area were surrounded by Plains Grassy Wetland vegetation and held large amounts of water. Aquatic and fringing vegetation was present at both dams and have the potential to support GGF, along with other native fauna including fish and waterbirds.

2.2.4 Scattered/planted trees

Six native scattered trees and rows of planted Monterey Cypress occur within the study area. The understory surrounding these trees consists of exotic vegetation modified through cattle grazing. It is likely that native fauna may use these trees, primarily woodland birds and birds adapted to modified areas, as they provide roosting, nesting and foraging sites. Despite this, it is unlikely that these trees provide a valuable habitat resource for any native animal.

2.2.5 Toomuc Creek

Toomuc Creek traverses the western section of the study area and was flowing at the time of survey. The primary EVC surrounding the creek is Swampy Riparian Woodland, with large patches of Gorse *Ulex europaeus* occurring in the surrounding paddocks. Fauna observed within the Swampy Riparian Woodland habitat surrounding the creek included Grey Fantail *Rhipidura albiscapa*, White-fronted Chat *Epthianura albifrons* and Red-bellied Black Snake *Pseudechis porphyriacus*. Directly north of the study area, Toomuc Creek is listed as a Category 1 protection area for GGF within the Sub-regional Species Strategy for GGF (DEPI 2013b), with records of the species adjacent to and within the study area (VBA 2018a; Figure 4). Within the study area, Toomuc Creek is recognised as potentially important habitat for GGF (DEPI 2013a). In addition, the habitat along Toomuc Creek, and surrounding Gorse patches, provides potential habitat for Southern Brown Bandicoot *Isodoon obesulus*, and may be used as a corridor by the species (Figure 2). The quality of the vegetation within the study area along Toomuc creek is considered to be of low quality to the species but does provide connectivity to areas of suitable habitat outside of the study area, and therefore there is the potential that the species would use the area along Toomuc creek within the study area on occasion.

3 ENVIRONMENTAL MANAGEMENT PLAN

3.1 Impacts on Existing Flora and Fauna

The proposed Cardinia Motor Recreation and Education Park development is expected to impact upon a large proportion of the study area (Figure 3), which includes impacts to all mapped patches of Plains Grassy Wetland and three scattered trees. The proposed use of the study area is as a world-class motor sport precinct involving the construction of racing circuits, grandstands, parking, a shooting range, commercial areas and a hotel. The proposed development aims to utilise all the land within Lot 3 (as shown on Figure 3) however restricts impacts to the additional Lots (being Lot 1 and Lot 2). Overall, the condition of the broader study area is poor. The total study area covers 128 hectares, of which the majority contains pasture paddocks dominated by exotic grasses or weed infestations. The cover of native vegetation within the study area is limited to vegetation surrounding the two waterways, one of which is being avoided (Toomuc creek), and the other, McGregor Road drain, is proposed to be diverted, which will involve impacts to native vegetation that has established around the boundary of the drain.

Within Lot 3, the McGregor Road drain is present which crosses north to south through the Lot, dividing the Lot into two sections. Avoidance of the drain would greatly impede the development of the study area, due to the central location of the drain. The development plan proposes to divert the McGregor Road drain along the northern and eastern boundaries of the study area, and then diverting back through Lot two to re-connect with Toomuc creek. The McGregor Road drain supports Plains Grassy Wetland vegetation and suitable habitat for GGF, which is proposed to be entirely removed. The proposed diverted drain will be constructed with an open plan design, with native species established along the banks of the waterway, in an effort to maintain a similar floristic structure to the removed drain to create a similar habitat for fauna likely to use the waterway.

3.1.1 Impacted vegetation

As part of the proposed development, it is understood that all vegetation within Lot 3 will be removed, which includes patches of Plains Grassy Wetland and one scattered tree. Vegetation within Lot 2 will also be removed, which includes two additional scattered trees and areas of Plains Grassy Wetland. A section of Swampy Riparian Woodland located along Toomuc creek in Lot 2 will be avoided (Figure 3), and no works are currently proposed in Lot 1. A total of 11.22 hectares of native vegetation (comprising three scattered trees and 11.12 hectares of native vegetation patches) is proposed to be removed (Figure 3).

All other areas outside the native vegetation patches shown in Figure 2 are not considered a native vegetation patch or scattered tree as they did not meet the Guidelines (DELWP 2017) definition of a patch of native vegetation or scattered tree at the time of the assessment.

3.1.2 Mitigation to native vegetation

There are areas of native vegetation within and immediately adjacent to the study area (outside of the impact area) that are to be retained, protected and managed (Figure 2). All patches of Swampy Riparian Woodland present along Toomuc creek, totalling 0.33 hectares, will be retained (Figure 2), along with three scattered trees (located in Lot 1).

The primary purpose of retaining remnant native vegetation is so that the study area can continue to support local flora and fauna, as well as cater for any fauna that may, currently or in the future, use it for dispersal. The retained vegetation will also act to buffer some of the edge effects that adjacent habitats may incur as a result of the development. The below information applies to the areas of native and exotic vegetation along Toomuc creek, which is located outside of the current proposed development area. The native and exotic vegetation present along Toomuc creek is considered potential habitat for Southern Brown Bandicoot, and the creek likely acts as a dispersal corridor for GGF. Protection of the ecological values within and surrounding the creek is recommended. The management of vegetation within these areas will be based around maintaining and/or creating suitable habitat for native fauna, therefore it is anticipated that the below vegetation mitigation measures will also be applicable to fauna protection. The retention, protection and management of these areas are detailed in the below sections relevant to construction timing. A summary of actions and timings is provided in Table 1.

3.1.3 Pre-construction

- Vegetation to be retained must be clearly marked and identifiable on site in order to reduce the likelihood of areas scheduled for retention being disturbed. Vegetation to be retained onsite will be protected with vegetation protection fencing and clearly identified as retained vegetation (Figure 2). These areas will be appropriately bunded and fenced off to avoid any runoff, sediment, pollutants etc. entering adjacent vegetation and habitats. Bunding and fencing will be in accordance with all relevant guidelines (AS 4970-2009, Australian Standard: Protection of trees on development sites) and will be undertaken by the relevant sub-contractor prior to the commencement of works. Within the study area, this applies to the vegetation and fauna habitat surrounding Toomuc creek, and the three scattered trees located in Lot 1;
- Vegetation protection fencing will be installed at the interface of the development and the corridor of retained vegetation (along the buffer boundary of Toomuc creek). Weatherproof signs will be installed along the fences, stating “No go zone – area of environmental significance.”;

The following measures relating to fencing and No-Go Zones will be implemented:

- No works are to take place within No-Go Zone and fences are not to be moved during the entire construction period and will not be removed until all works have been completed to the satisfaction of Responsible Authority;
- No machinery or construction equipment, waste, storage materials or unauthorised personnel are permitted within established No-Go Zones;
- Specific areas designated for vehicle re-fuelling and maintenance, dumping of waste and storage of materials and equipment will be located outside the No-Go Zones. In addition, no entry or exit pits for underground services are permitted within the No-Go Zones;
- Temporary signage will be installed along the perimeters of the No-Go Zone. All signage will be maintained until construction works are complete or until replaced by permanent fencing. Signage will be installed in order to:
 - Highlight the area as an ecologically sensitive area;

- Prevent accidental entry by construction personnel; and,
 - Prevent vegetation trampling, rock disturbance and rubbish ingress by construction workers during the construction phase.
- Measures and protocols for protecting remnant vegetation will be covered during the environmental site inductions;

3.1.4 During Construction

- The project Head Contractor’s Project Manager will undertake monthly routine inspections of the temporary fencing and signage and will organise any required maintenance ensuring that it is carried out in a timely manner and to a satisfactory standard;
- Any accidental damage to the fencing or the retained vegetation during construction will be reported to the Head Contractor’s Project Manager immediately, who will assess the extent of damage and effect the required corrective actions and reporting (including informing the Cardinia Shire Council if any vegetation is damaged). All incidents will be recorded in a logbook, with the logbook available for inspection at all times by the Responsible Authority; and
- Vehicle and machine access, wash down and set down, and excavation material stockpiling will be limited to the areas specifically designated for these activities (away from Toomuc creek). These areas will be appropriately bunded and fenced off to avoid any runoff, sediment, pollutants etc. entering adjacent vegetation and habitats.

Table 1. Summary of actions, timing, objectives, key responsible person/s and performance indicators for the protection of remnant vegetation and habitat

Action	Timing	Key objective	Responsible person/s	Performance indicator
Environmental site inductions.	Pre and during construction.	Ensure all persons are informed and aware of the ‘no go zone’ areas and restrictions, as well as designated parking, stockpiling and set down areas.	Head Contractor’s Project Manager.	Record of inductions in logbook.
Installation of fencing to protect retained vegetation.	Pre-construction.	Ensure required ‘no go zone’ areas are achieved and there are no breaches in planning permit and offset approvals.	Head Contractor’s Project Manager and Contractors.	No damage to retained vegetation or fencing, no breach of planning permit and offset approvals.
Routine inspections of fencing installed to protect retained vegetation and required maintenance carried out.	Pre and during construction.	Avoid unintended damage to retained vegetation so that it can continue to support local flora and fauna.	Head Contractor’s Project Manager, Contractors and Staff.	No damage to retained vegetation.

Action	Timing	Key objective	Responsible person/s	Performance indicator
Reporting of any damage to fencing or retained vegetation.	Pre and during construction.	Avoid unintended damage to retained vegetation so that it can continue to support local flora and fauna. All incidents logged.	All Managers, Contractors and Staff.	No damage to retained vegetation. All incidents logged. Logbook available for inspection by the responsible Authority.

3.1.5 Monitoring and reporting

The implementation of all measures to protect native vegetation, as well as any incident impacting on retained vegetation must be logged in a Logbook by the Head Contractor’s Project Manager. The logbook must be made available for inspection by the Responsible Authority at all times.

3.2 Plant Disease and Pest Plant Management

Earthworks and construction associated with the development will involve the removal and transportation of plant material and soil as well as, the use of various machineries, vehicles and equipment. This means that there is an innate risk of spreading plant diseases and pest plants to and from the study area (and areas adjacent). Several measures are required to reduce the risk of spreading plant disease and pest plants, and these will include the following, and are summarised in Table 2:

3.2.1 Pre-construction

- The plant disease and pest plant management protocols will be covered during the environmental site inductions;
- Landscape and garden designs will avoid the introduction of non-indigenous plant species;
- The ‘pre-construction’ measures outlined in Section 3.2.1 to protect and manage remnant vegetation are also applicable as measures to reduce the spread and establishment of plant diseases and pest plants. See Section 3.2.1 for the details of these measures.
- A pest plant survey of the study area and of the adjacent conservation reserves (up to 100 metres from the study area) will be carried out by a qualified Botanist, to:
 - identify and map pest plant species;
 - identify high threat species; and
 - outline priority species, priority areas, methodologies and schedules for pest plant control.
- The aforementioned will then be used to guide the Environmental Manager and pest plant control contractors, in order to manage pest plants within the study area.

- Pest plant control contractors with demonstrated experience working in ecologically sensitive environments will be engaged to undertake pest plant control. The contractors will also have demonstrated knowledge of the risks, and methods to avoid impacts of chemical use in and around aquatic systems, including alternatives to chemical use in these systems.

Actions to limit the spread of diseases and pest plant species will follow best-practice protocols developed elsewhere, specifically the Department of Environment and Climate Change (NSW) (2008) 'Hygiene protocol for the control of disease in frogs', and the Tasmanian 'Keeping it Clean' manual (NRM South 2010) and Chytrid Management Plan (Philips *et al.* 2011). Between them, these protocols address the potential spread of weeds and a range of plant and animal diseases including Chytridiomycosis *Batrachochytrium dendrobatidis* and *Phytophthora cinnamomi*.

3.2.2 During Construction

- Prior to entering the construction zone, all machinery, vehicles, equipment and footwear will be washed and disinfected at designated wash bays;
- All machinery and vehicles not exiting the construction zone will be set down in a designated area each evening. These vehicles and machinery will be washed down and disinfected at the wash down bays once per week;
- Before exiting the construction zone, all machinery, vehicles, equipment and footwear will also be washed and disinfected at designated wash down bays;
- A logbook will be kept at each wash down bay and the entries inspected by the Environmental Manager to ensure compliance;
- Daily inspections of the wash down bays will be undertaken by the Environmental Manager to ensure that the facilities and disinfectants are stocked, not contaminated and in working order. Inspections and required actions will be recorded in the log book and kept on file;
- Monitoring of the study area (including areas where construction has taken place and stockpiles of soil) by the Environment Manager and pest plant control contractors will be undertaken to identify the introduction and establishment of any new pest plants, and to implement control actions accordingly.

3.2.3 Post-construction

- Immediately post construction (when soil exposure and disturbance is still high), the machine, vehicle, equipment and footwear hygiene protocols implemented during construction (Section 3.2.2 above) will continue. The Environmental Manager will exercise discretion as to when these procedures can cease and when it is suitable to decommission the wash down bays;
- Any areas scheduled for rehabilitation or landscaping will be restored as soon as possible with indigenous plant species. This is to minimise the window of soil disturbance that could facilitate the

spread or establishment of plant diseases and pest plants, and to ensure that non-indigenous plants, which could spread and establish into remnant native vegetation, are not introduced to the local area;

- Any new landscaping or gardening projects within the study area will endeavour to also only use indigenous species;
- Any persons required to enter retained remnant vegetation within or adjacent to the study area (e.g. for pest plant control, surveys or otherwise) will be required to wash down and disinfect footwear, vehicles and equipment prior to entering the area, and to provide confirmation to the Environmental Manager that they have done so;
- Ongoing pest plant control will be carried out by the pest plant control contractors. The pest plant control contractors and the Environmental Manger will continue to monitor the study area to identify the establishment of new weeds and implement control actions accordingly;

Table 2. Summary of actions, timing, objectives, key responsible person/s and performance indicators for plant disease and pest plant management

Action	Timing	Key objective	Responsible person/s	Performance indicator
Landscape, garden and rehabilitation designs and works, will endeavour to use indigenous plants.	Pre and construction and ongoing.	Avoid the introduction of non-indigenous plants, which could establish and spread, into the local area.	Environmental Manager, and relevant Contactor/s and Staff.	No invasive non-indigenous plants used in landscaping, gardening or rehabilitation.
Environmental site inductions.	Pre, during and post construction, and ongoing.	Ensure all persons are understand the plant disease and pest plant protocols, and the 'no go zone' and designated areas for parking, stockpiling, wash down and set down etc.	Environmental Manager.	Questionnaire and record of inductions in log book.
All of the pre, during and post construction measures outlined to protect and manage remnant vegetation in Section 3.2.	Pre, during and post construction, and ongoing.	Reduce the likelihood of vegetation scheduled for retention being disturbed and plant diseases or pest plants spreading and establishing.	Numerous (refer Table 1 in section 3.2).	Numerous (refer Table 1 in section 3.2).
Pre- construction pest plant survey.	Pre-construction.	Collect and collate information to guide pest plant management and achieve effective results.	Consultant Botanists.	Survey undertaken and information provided.
Engage suitable pest plant control contractors.	Pre, during and post construction, and ongoing.	Ensure effective control of pest plants and no non-target impacts.	Environmental Manager.	Pest plants controlled and no non-target impacts incurred.

Action	Timing	Key objective	Responsible person/s	Performance indicator
Machinery, vehicle, equipment and footwear hygiene protocols	Pre, during and post construction, and ongoing	Minimise the risk of plant diseases and pest plant material coming in to or going out of the study area, establishing and spreading	Environmental Manager, Contractors, Consultants and Staff	Log books filled in upon inspections, inspections carried out and no non-compliance reported
Daily inspections of wash down bays.	During and post construction.	Ensure facilities are in working order, stocked and not contaminated.	Environmental Manager.	Inspections undertaken, recorded and necessary corrective actions undertaken.
Pest plant control and monitoring of study area for any new or spreading pest plants.	Pre, during and post construction, and ongoing.	Rapidly identify new and spreading pest plants and implement control immediately.	Environmental Manager and Contractors.	Any new or spreading pest plants identified and controlled.
Rapid rehabilitation and landscaping with indigenous plants.	Post construction.	Minimise window of soil disturbance that could facilitate the spread and establishment of plant diseases and pest plants.	Environmental Manager and Contractors.	Rehabilitation and landscaping undertaken rapidly.
Post-construction pest plant survey.	2 and 5 years post construction.	To report upon the effectiveness of the pest plant control program and make any additional recommendations.	Environmental Manager and Consultant Botanists.	Surveys undertaken and recommendations made.

3.2.4 Monitoring and reporting

A 2 and 5-year post-construction pest plant survey will be undertaken by a qualified Botanist within the study area and the adjacent Toomuc Creek to report upon the effectiveness of the pest plant management and make any additional recommendations.

3.3 Impacts to Native Fauna

The DPO16 specifically addresses three fauna species that require consideration; GGF, Southern Brown Bandicoot and Dwarf Galaxias.

All areas of Plains Grassy Wetland were identified as suitable habitat for GGF and are proposed to be impacted. This primarily includes the vegetation that surrounds the McGregor Road drain, which is proposed to be diverted around the eastern edge of the study area.

Potential habitat for Southern Brown Bandicoot was identified along Toomuc Creek within the patches of Swampy Riparian Woodland and in the exotic vegetation surrounding the creek where Gorse and Blackberry

Rubus sp. was prevalent. These areas of vegetation are currently not proposed to be impacted and will be fenced off during construction to prevent damage to the vegetation and Toomuc creek.

Targeted surveys for Dwarf Galaxias have previously been undertaken within and close to the study area, with no individuals recorded (Monarc 2018b; Ecology and Heritage Partners 2012). As a result, the species is considered unlikely to occur within the study area due to the absence of records from past survey attempts.

3.3.1 *Native Fauna Salvage and Management*

Areas of existing fauna habitat (i.e. areas of Plains Grassy Wetland and scattered trees) are proposed to be removed from the study area and as such there is a need to implement appropriate measures to reduce the risk of injury and mortality of any local native fauna, which may be present. These measures will include the following.

3.3.2 Pre-construction

- Prior to construction the number of qualified Zoologists required on site will be determined through discussion with the developer, upon the provision of a staging plan and through on ground assessments. Patches of remnant vegetation to be retained will be identified and will be utilised during salvage and translocation procedures (in accordance with relevant permits, and Standard Procedures for the Capture and Release of Birds, Mammals, Reptiles and Frogs outlined in Appendix 1);
- Habitat removal will be planned so that it is undertaken outside of Spring and early Summer when the majority of local native fauna species are breeding and/or have dependent young, and when hollow and burrow use is generally highest;
- Fallen logs and leaf litter will be inspected by a qualified Zoologist prior to the removal of remnant vegetation to assess the presence of ground dwelling mammals, marsupials, snakes and skinks. Areas that are clearly inhabited will be identified and will be removed;
- Prior to the removal of remnant vegetation from the study area, rabbit control (in accordance with the pest animal management program, see Section 3.4) will be undertaken to reduce the number of rabbits fleeing the area and moving into adjacent habitats, including along Toomuc Creek;
- Engagement of vegetation removal contractors with demonstrated experience working in ecologically sensitive areas and on projects that have a fauna salvage requirement;
- Prior to the removal of any waterbodies, they must be drained, and all efforts must be made to dry the waterbody out and passively render it inhospitable to waterbirds and frogs.

3.3.3 During Construction

- Where practical and feasible, a staged approach to vegetation removal will be implemented whereby vegetation will be removed from top down (i.e. removal of canopy trees → large shrubs and trees → medium and small shrubs → ground covers and other refuge). This will act to gradually render the

construction area inhospitable to local fauna, thus encouraging individuals out of the area and reducing risk of injury/mortality;

- After the aforementioned vegetation removal, small mammal exclusion fencing will be installed at the interface of the vegetation to be retained and that to be removed in Lot 3 (i.e. between Lot 3 and Toomuc Creek). This is to discourage any small mammals moving into the construction zone. The fencing is to be installed after vegetation removal so that any fauna fleeing on their own accord into adjacent habitats during removal are not impeded to do so;
- Zoologists will be present for all habitat removal (vegetation and waterbody), to undertake pre-clearance searches, guide contractors in best-practice to minimise the risk of injury or mortality of fauna, and if necessary capture and relocate fauna out of harm's way into suitable, pre agreed upon adjacent habitats (in accordance with relevant permits, and Standard Procedures for the Capture and Release of Birds, Mammals, Reptiles and Frogs outlined in Appendix 1);
- For the removal of the scattered trees and patches of exotic shrubs (i.e. Gorse/Blackberry), the aforementioned will specifically include the following.
 - Zoologists carrying out pre-clearance search for nests or signs that fauna may be harbouring in hollows, spouts or fissures;
 - Zoologists communicating with the contractors about how to best remove trees and large shrubs to avoid injury to native fauna. For large trees, the most effective way to achieve this is to use an excavator to gently dig into the ground at the base of the tree and then use the excavator claw or bucket to gently uproot and push the tree over. Where feasible, the excavator claw can also be used to gently lower the tree to the ground. By using this method, the tree may be levered out of the ground and gently lowered, as opposed to felling the tree with a chainsaw which usually results in the tree crashing heavily to the ground, damaging hollows and other refugia as well as fauna within them;
 - Once the tree/shrub is on the ground, the Zoologists will inspect it for fauna and if possible, capture and release the fauna into suitable habitat onsite that is scheduled for retention (in accordance with relevant permits, and Standard Procedures for the Capture and Release of Birds, Mammals, Reptiles and Frogs outlined in Appendix 1);
 - If fauna cannot be captured (e.g. possums shelter deep in a hollow and cannot be removed without injury to the possum and/or the Zoologists), if possible, the portion of the tree within which the animal is harbouring will be relocated out of harm's way into suitable vegetation nearby that is scheduled for retention (i.e. Swampy Riparian Woodland along Toomuc Creek). This allows the animal to emerge unassisted in the evening and relocate itself. If this is not possible, the entire tree will be left in-situ for a minimum of one night to allow the animal to emerge unassisted in the evening and relocate itself. Prior to any

removal of the felled habitat tree (i.e. the next morning) the Zoologists will inspect and ensure the animal is no longer present;

- For the removal of any fallen hollows, the aforementioned will specifically include the following.
 - Prior to removal a qualified Zoologist will inspect the fallen hollow to determine whether it is currently being utilised as habitat by ground dwelling animals. If the hollow is deemed to be inhabited then removal of the hollow will be postponed until all uninhabited areas scheduled for removal have been cleared. This will allow time for fauna to passively remove themselves from the area, as fauna, when disturbed tend to vacate themselves at the earliest opportunity.
 - Inhabited fallen hollow logs will be carefully relocated by mechanical means to suitable pre-agreed upon areas that are scheduled for retention. This action will occur within the presence of a qualified Zoologist. Any fauna that is disturbed will be humanely caught by a qualified Zoologist and released in areas scheduled for retention. Fauna may only be translocated to an area less than 100 metres in distance from where the animal is caught.
 - Once hollow logs have been removed a rubber wheeled grader equipped with rippers fitted with five large shanks will rip the soil to a maximum depth of 300 millimetres (DES 2011). This will disturb any remaining reptiles inhabiting burrows or cracks in the earth and allow for capture and translocation by a suitably qualified Zoologist.
- For the removal of any waterbodies, the aforementioned will specifically include the following.
 - Immediately prior to the removal of any vegetation or refuge (e.g. logs, rocks) in and around the waterbody, a qualified Zoologist will inspect the area for any fauna, encourage any fauna out of harm's way (e.g. flush out waterbirds) or capture and relocate fauna (in accordance with relevant permits, and Standard Procedures for the Capture and Release of Birds, Mammals, Reptiles and Frogs outlined in Appendix 1).
 - For the removal of any vegetation or refuge in and around the waterbody, a qualified Zoologist will communicate with the contractors about how to best undertake removal to avoid injury to fauna.
 - Once vegetation and refuge has been removed, a qualified Zoologist will be present for any earthworks undertaken in the top 30 cm of the soil profile to salvage and relocate any frogs that may be harbouring in the topsoil (in accordance with relevant permits, and Standard Procedures for the Capture and Release of Birds, Mammals, Reptiles and Frogs outlined in Appendix 1)
- At any time during the removal of habitat, a qualified Zoologist may request work to pause if:
 - an animal is at risk of direct injury or mortality;
 - an animal requires capture and relocation; and,

- o an animal is injured and requires medical attention.
- In the event that an animal is injured during construction, a qualified Zoologist will act in accordance with relevant permits, and Standard Procedures for the Capture and Release of Birds, Mammals, Reptiles and Frogs outlined in Appendix 1.
- If during the construction phase, there are any trenches or holes left uncovered overnight, morning inspections by a qualified Zoologist must be undertaken to ensure no local fauna have become trapped. Any fauna uncovered will be captured and released into suitable habitat;
- Salvage outcomes will be reported to the relevant authorities where relevant (i.e. DELWP);

3.3.4 Post-construction

- Protection and management of remnant vegetation to be retained as per Section 3.1.3.

Table 3. Summary of actions, timing, objectives, key responsible person/s and performance indicators for the native fauna salvage and management

Action	Timing	Key objective	Responsible person/s	Performance indicator
Plan habitat removal outside of spring and early summer.	Pre-construction.	To avoid the season when hollow use is highest and the majority of local fauna species are breeding and/or have dependent young.	Podium 1 (or relevant permit holder) and Environmental Manager.	No incidence of fauna injury or mortality, or orphaned young, during habitat removal.
Rabbit control.	Pre-construction (prior to removal of vegetation).	Avoid rabbits flooding into adjacent habitats and causing disturbance to vegetation and local fauna.	Environmental Manager and Contractors.	No rabbits fleeing into adjacent habitats during vegetation removal.
Engagement of contractors with demonstrated experience working in ecologically sensitive areas and on projects that have a fauna salvage requirement.	Pre-construction.	Ensure contractors have the expertise to undertake habitat removal to minimise the risk of injury and mortality of fauna.	Environmental Manager.	No incidence of fauna injury or mortality during habitat removal.
Drain any waterbodies	Pre-construction.	Passively render waterbody inhospitable to waterbirds and frogs.	Environmental Manager and Contractors.	Waterbody dry before habitat removal begins.
Staged approach to vegetation removal.	During construction.	Gradually render the construction area inhospitable to local fauna, thus encouraging fauna out of the area and minimising risk of injury or mortality.	Environmental Manager, Contractors and Consultant Zoologists.	No incidence of fauna injury or mortality during habitat removal.

Action	Timing	Key objective	Responsible person/s	Performance indicator
Installation of small mammal exclusion fencing.	During construction (after vegetation removal).	Discourage any small mammals moving into the construction zone and being injured or killed.	Environmental Manager, Consultant Zoologists and Contractors.	No small mammals entering construction zone.
Pre-clearance searches and salvage of fauna.	During construction.	Minimise risk of injury or mortality of fauna and ensure relocation into suitable habitats to maximise chance of survival.	Consultant Zoologists and Contractors.	No incidence of fauna injury or mortality during habitat removal.
Morning inspections by of any trenches or holes left uncovered.	During construction.	Check for any fauna trapped overnight, and release them into suitable habitat.	Consultant Zoologists.	Inspections undertaken as required.
Report salvage outcomes to relevant authorities.	During and post construction.	Document the outcomes of the salvage and fulfil relevant permit and authorisation obligations.	Consultant Zoologists and Environmental Manager.	All data and reports submitted.

3.3.5 Monitoring and reporting

The implementation of all measures to protect native vegetation and fauna habitat, as well as any incident impacting on flora and fauna must be logged in a Logbook by the Environmental Manger. The logbook must be made available for inspection by the Responsible Authority at all times).

3.4 Pest Animal Management

Additional buildings, infrastructure, human habitation and human activity associated with the development have the potential to support additional pest animals, which can impact upon native flora and fauna in the local landscape. A number of measures will be implemented to avoid and minimise the occurrence of this. These are summarised in Table 4, and detailed below:

3.4.1 Pre-construction

- A pest animal survey of the study area and of the adjacent conservation reserves (up to 100 metres from the study area) will be carried out by a qualified Zoologist to:
 - identify pest animal species known or likely to occur within the local area;
 - identify high threat species; and
 - outline priority species, priority areas, targets, methodologies and schedules for pest animal control.
- The aforementioned will then be used to guide the Environmental Manager and pest animal control contractors, to manage pest animals within the study area.

- Pest animal control contractors with demonstrated experience working in ecologically sensitive areas will be engaged to undertake pest animal management. The contractors will also have demonstrated knowledge of the risk of, and methods to avoid, non-target poisoning and secondary poisoning (particularly relating to native mammals), as well as the relevant requirements and limitations associated with working near human habitation;
- The pest animal contractor will prepare a pest animal control program for rabbits, cats, dogs, foxes black rats and/or house mouse populations, where appropriate, in accordance with industry standards. This plan must be approved by the Responsible Authority prior to implementation;
- Prior to the removal of remnant vegetation from the study area, rabbit control will be undertaken to reduce the number of rabbits fleeing the area and moving into adjacent habitats, including Toomuc Creek.

3.4.2 *During Construction*

- Pest animal control for all identified populations will commence within the remnant vegetation to be retained, so as to minimise any increase in pest animals along the interface of the development and adjacent habitats;
- The presence of pest fauna, as well as any management undertaken to reduce and/or control pest fauna must be logged with the Environmental Manager.

3.4.3 *Post-Construction*

- The built environment and the grounds of the study area will be maintained appropriately to limit the build-up and availability of material and waste that may otherwise act as harbour or provide food for pest animals. This will involve:
 - no stockpiling of debris or waste;
 - regular mowing of grass in the open landscaped areas;
 - control of grass and weeds throughout the built-up areas; and
 - outdoor bins that are adequately sealed and cannot be accessed by rodents, foxes, dogs or cats.
- Ongoing pest animal control for all identified populations will be carried out by the pest animal control contractors within the remnant vegetation to be retained;
- Ongoing pest animal monitoring for any new threats will be undertaken throughout the built environment of the development;

Table 4. Summary of actions, timing, objectives, key responsible person/s and performance indicators for pest animal management

Action	Timing	Key objective	Responsible person/s	Performance indicator
Identification of pest animal species, priority species and areas, targets, methodologies and schedules for pest animal control.	Pre-construction.	Collect and collate information to guide pest animal management and achieve effective results.	Consultant Zoologists.	Survey undertaken and information provided.
Engage suitable pest animal control contractors.	Pre during and post construction, and ongoing.	Ensure effective control of pest animals and no non-target or secondary impacts.	Environmental Manager.	Pest animal diversity and abundance controlled and no non-target impacts incurred.
Pre-construction rabbit control.	Pre-construction (prior to removal of vegetation).	Avoid rabbits flooding into adjacent habitats and causing disturbance to vegetation and local fauna.	Environmental Manager and Contractors.	No rabbits fleeing into adjacent habitats during vegetation removal.
Pest animal control.	Pre, during and post construction, and ongoing.	Minimise any increase in pest animal species or abundance in the local area.	Environmental Manager and Contractors.	Ongoing control undertaken, no obvious increase in pest animals.
Appropriate maintenance of the environment and grounds.	Pre- during and post construction, and ongoing.	Limit the build-up and availability of material and waste that may harbour or provide food for pest animals.	Environmental Manager, Businesses and Staff.	Grounds and environment maintained, no build up of harbour or food for pest animals.
Post construction pest animal survey.	2 and 5 years post construction.	To report upon the effectiveness of the pest animal management and make any additional recommendations.	Environmental Manager and Consultant Zoologists.	Surveys undertaken and recommendations made.

3.4.4 Monitoring and reporting

A 2 and 5-year post construction pest animal survey will be undertaken by a qualified Zoologist, within the retained remnant vegetation along Toomuc Creek (up to 100 meters from the study area) to report upon the species and abundance of pest animals present, the effectiveness of the pest animal management and make any additional recommendations.

3.5 Retained Vegetation and Revegetation Methods

Retained vegetation within the study area is restricted to the patches of Swampy Riparian Woodland present along Toomuc Creek and three scattered trees located in Lot 1. The trees will have temporary fencing erected around the root zones to prevent any damage, and a No-Go zone will be established within a buffer zone of Toomuc Creek during construction, to prevent damage to native vegetation and the creek corridor itself. Areas of proposed re-vegetation should be revegetated with local provenance plant species, suited to the area. Revegetation species should be based on the Ecological Vegetation Class (EVC) present, or modelled to be present, in the study area. A summary is given below in Table 5, and Appendix 2 includes relevant EVCs to the study area which includes a list of plant species that are suitable for use in revegetation.

Table 5. Recommended EVC for revegetation within the study area.

EVC	Suitable area to revegetate and benefit to fauna
Plains Grassy Wetland	Drainage line edges and low-lying areas. This EVC is present along the McGregor Road drain, and revegetation of drainage lines and low-lying areas should refer to the EVC species list for recommended flora species. Revegetation of wetland areas will create suitable habitat for fauna, such as frogs.
Swampy Riparian Woodland	Swampy Riparian Woodland is present along Toomuc Creek. Although not proposed to be impacted, the area currently contains a high cover of weeds. Staged removal of these weeds incorporated with revegetation with native species should be undertaken. Staged removal and revegetation is recommended to avoid loss of habitat to fauna using the weed area. Revegetation should focus on species key to Southern Brown Bandicoot, which may use the vegetation along Toomuc Creek as a movement corridor.
Plains Grassy Woodland	This EVC is not currently present within the study area due to previous land clearing removing the native vegetation. Modelled EVC data indicates this EVC occurred across the study area where the exotic pasture grass and native scattered trees are currently present. Revegetation within areas of exotic pasture grass should refer to the Plains Grassy Woodland EVC species list for recommended species.

3.6 Management of Impacts on Creek Lines

Toomuc creek is present within the study area, however is located outside of the proposed development area and is not expected to be impacted by the proposed works. This area contains potential habitat for Southern Brown Bandicoot, and therefore any revegetation should consider species that provide suitable habitat for Southern Brown Bandicoot, along with weed management methods that will not displace fauna. Specific mitigation measures will be established to ensure Toomuc creek and the surrounding vegetation is not impacted during the construction or operation of the proposed development. Mitigation measures will include:

- Fencing and establishment of No-Go zones (Section 3.1);
- Water quality testing (Section 4.5.1.4); and,
- Revegetation with native plant species (Section 3.5).

4 GROWLING GRASS FROG MANAGEMENT PLAN

The primary objective of this section of the EMP is to address the GGF management plan requirement outlined in the DPO16. The below GGF Management Plan is based on the current proposed wetlands included in the Master Plan (V3) provided on 19 July 2019. Where appropriate, the wetlands will incorporate features considered suitable for GGF habitat (as outlined below), however the wetlands will not be specifically designed as habitat for GGF. Despite this, there is potential that the wetlands will be able to support habitat features suitable for the species, and therefore are likely to provide habitat or at minimum will not impede the dispersal of GGF along the diverted McGregor road drain waterway.

Further consideration of future strategic connectivity and future conservation for GGF may be required but is not addressed in this GGF Management Plan.

4.1 Conservation Status

GGF is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), endangered under the DSE Advisory List (DSE 2013), and is listed as Threatened under the FFG Act.

Although previously widely distributed across south eastern Australia, including Tasmania (Littlejohn 1963, 1982; Hero *et al.* 1991), the species has declined markedly across most of its former range. The decline has been most evident over the past two decades and in many areas, particularly in south and central Victoria, where populations have experienced apparent declines and local extinctions due extensively to loss and degradation of habitat and barriers to movement (Mahoney 1999; A. Organ. pers. obs.).

4.2 Habitat Requirements

GGF is largely associated with permanent or semi-permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites) (Hero *et al.* 1991; Barker *et al.* 1995; Cogger 1996; Ashworth 1998). This species can also utilise temporarily inundated waterbodies for breeding purposes providing they contain water over the breeding season (Organ 2003).

Based on previous investigations there is a strong correlation between the presence of the species and key habitat attributes at a given waterbody. For example, the species is typically associated with waterbodies supporting an extensive cover of emergent, submerged and floating vegetation (Robertson *et al.* 2002, Organ 2004, 2005). Emergent vegetation provides basking sites for frogs and protection from predators, while floating vegetation provides suitable calling stages for adult males and breeding and oviposition (egg deposition) sites. Terrestrial vegetation (grasses, sedges), rocks and other ground debris around wetland perimeters also provide foraging, dispersal and over-wintering sites for frogs.

Recent studies have revealed that the spatial orientation of waterbodies across the landscape is one of the most important habitat determinants influencing the presence of the species at a given site (Robertson *et al.* 2002; Heard *et al.* 2004; Hamer and Organ 2008). For example, studies have shown there is a positive correlation between the presence of the species and the distance of freestanding waterbodies to another occupied site. This is comparable to the spatial dynamics of many amphibian populations, including the closely related Green and Golden Bell Frog *Litoria aurea* (Hamer *et al.* 2002).

During a study on GGF movement, an individual frog moved 427 metres from a pool on the Merri Creek to a pool on the Curley Sedge Creek in Somerton, following its inundation by heavy rainfall in February 2005 (Heard et al. 2010). Overland movements of up to 490 metres were also documented (Heard et al. 2010). Other examples of frog movements have been documented in a study in Pakenham, where tagged frogs have moved at least 200 metres between waterbodies (Hamer and Organ 2008).

Frogs are often located at the waterline, or in the nearby terrestrial zone (<100 metres from the waterline) (Heard et al. 2008; Heard et al. 2010; A. Organ pers. obs.), which highlights the importance of adequate buffers around wetlands and creeks. Dispersal is thought to occur primarily along drainage lines or other low-lying areas between waterbodies, and unhindered movement between and within waterbodies is considered important for population viability.

4.3 Threatening Processes

Causes of the decline of GGF are not fully understood. However, factors that are likely to have contributed to the decline include habitat loss, fragmentation and degradation of habitat (such as land clearing for agriculture and urban development), altered flooding regimes of natural water bodies, predation on eggs and tadpoles by introduced fish, salinisation, chemical pollution of water bodies by fertilisers and pesticides, and infection by the amphibian Chytrid Fungus (White and Pyke 1996).

4.4 Occurrence of the Species within the Study Area

A total of 260 GGF records have been recorded within 10 kilometres of the study area (DELWP 2018). A recent targeted survey was undertaken for the species within the study area, and although the weather conditions during the surveys were conducive for frogs to be active, no GGF were detected. During the surveys, common frog species, such as Striped Marsh Frog *Limnodynastes peronii*, Verreaux's Frog *Litoria verreauxii verreauxii* and Common Eastern Froglet *Crinia signifera* were recorded within the study area. Incidental records of GGF were recorded approximately one kilometre north and 400 meters south of the study area, in dams located close to Toomuc Creek and a small drain that runs along McGregor Road. These individuals were recorded during the targeted surveys that occurred in November and December 2018 (current survey efforts), during a broader search of the area to identify if the species utilised near-by waterbodies.

Despite not recording individuals during the targeted survey, habitat within the study area is considered suitable to support the species, and due to the locations of records and suitable habitat (e.g. large dam directly to the east of Toomuc Creek north of the study area) above and below the study area, it is possible that the species uses the study area on occasion, either for breeding, foraging or as a corridor between external suitable sites. Due to this, Toomuc Creek, and the Plains Grassy Wetland and associated McGregor Road drain present within the study area is considered likely to form part of a dispersal corridor for the species (Plate 1; Plate 2). Further details regarding suitable habitat within the study area is provided in the biodiversity report (Ecology and Heritage Partners 2019).



Plate 1. McGregor Road drain within the study area (Ecology and Heritage Partners Pty Ltd 30/08/2018).



Plate 2. Toomuc Creek within the study area (Ecology and Heritage Partners Pty Ltd 30/08/2018).

4.5 Implementation, Timeframe and Review

The GGF EMP will be implemented by Podium 1 (or relevant permit holder) and their contractors before, during and after completion of construction works. Management recommendations may need to alter if new information becomes available, such as changes in development footprint design or area, or if management actions are considered inappropriate or inadequate for the long-term persistence of GGF.

The study area covers the parcel of land at 21, 75 and 115 Key Lane, and 335 McGregor Road, Pakenham (Figure 1), focussing on the waterways and dams located within the study area. Timeframes for commencement and completion of works will be negotiated between the successfully tendered development contractor and Podium 1 (or relevant permit holder).

For the purposes of this GGF Management Plan, development actions have been divided in to three phases:

- Pre-development – actions required prior to the realignment of waterways and prior to the removal of any vegetation or topsoil;
- Development – any actions associated with the realignment of waterways, installation of wetlands and any associated activities; and
- Post-development – actions required upon completion of realignment of waterways and installation of wetlands.

4.6 Pre-Development Phase

4.6.1 Staging of Proposed Works

The McGregor road drain will be diverted to the east, around the development area, and will feed back through a wetland system located in Lot 2, as shown in the current proposed Development Plan provided on 19/07/2019. A drainage strategy has been prepared by Stormy Water Solutions (Stormy Water Solutions 2019) for the proposed development. The wetlands will be designed for the purpose of performing flood conveyance, flood reduction and stormwater treatment. Although not specifically designed as GGF habitat

ponds, the wetlands located within Lot 2 will contain habitat features suitable for GGF (e.g. aquatic vegetation, rocks, shallow/deep areas).

The realigned creek channel and associated waterbodies must be created as soon as works approval is granted and prior to any impacts on the existing waterways. This is of primary importance to allow a period of establishment for the diverted creek and wetlands (e.g. vegetation and habitat suitable for use by GGF) to ensure that local fauna are able to relocate to alternative habitat upon removal of existing habitats, and suitable habitat for GGF is available at all times throughout the development process.

4.6.2 Design Considerations: GGF Wetlands

Examples of schematics used in the design of wetland creation are included in Appendix 3. The Growing Grass Frog Habitat Design Standards (DELWP 2017b) provide habitat design recommendations to create suitable habitat for the species, which should be given consideration when developing the wetland system in Lot 2.

The below information should be used as a guide when developing the wetland system.

Design

Specific design requirements should consider the following:

- Wetlands should be located above the 1 in 10 year flood level. This will prevent water from the creek line from entering the wetland, thereby minimising the likelihood that flood events allow entry of predatory fish to created wetlands;
- Surface area of wetlands to approach 3837 metres² wherever possible (Heard *et al.* 2010), and a minimum of 1000 metres²;
- Wetland shape designed to provide a high edge to area ratio, to maximise marginal refuge areas, with smaller areas of open water;
- Wetland must be able to be drained via an effective and straightforward drainage mechanism, such as a drainage valve or regulator installed to enable the water to be drained if necessary;
- Smaller ephemeral wetlands should be created around the larger permanent wetlands to act as smaller movement corridors around the study area, and to provide additional habitat that is more likely to remain fish-free, because it will dry out during extended dry periods;
- Wetlands/waterways and frog ponds will be surrounded by a terrestrial buffer of at least ten metres in which there is no development, mowing, slashing or use of herbicides and pesticides, but which may be landscaped with indigenous grasses, herbaceous species and low shrubby vegetation (but no trees);
- Should be clay-lined to retain water with a loamy or sand-substrate topsoil; and,
- Trees and/or large shrubs must not be planted within 20 metres of the banks of wetlands as this may shade out ponds, thus potentially rendering them unsuitable for GGF.

Water Level

GGF wetlands should contain permanent water where possible and be constructed between 1.5 metres and four metres in depth (Appendix 3).

Where constructed wetlands are unable to be dug to four metres deep, water levels should be maintained to their maximum level throughout the year, especially during the breeding season of the species (i.e. between late September and February), and be subject to intensive vegetation monitoring and clearance (as required), to maintain breeding habitat suitability for GGF. The maximum depth will vary between wetlands depending upon the area of the upstream catchment.

Vegetation and Habitat Features

Wetlands should support an extensive cover of aquatic and semi-aquatic vegetation to ensure that there is sufficient nutrient uptake to enhance water quality in wetlands. To achieve these habitat requirements, in each wetland there should be four distinct zones (Appendix 3):

- Littoral/ Ephemeral Wetland Zone
- Entry Zone
- Embankment Zone
- Deep Water Zone

Littoral/ Ephemeral Zone with bare ground areas

The aim is to establish a moderate percentage cover of vegetation with bare ground areas for refuge to frogs occupying the margins of the pond. The margins will remain dry for extended periods, whilst the littoral/ephemeral zone will be subject to periodic inundation, and therefore must support plants able to tolerate wet conditions. The zone should be created to incorporate the following structural features (Appendix 3):

- A minimum width of five metres of ephemeral wetland zone should be created;
- A minimum topsoil depth of 150 mm to all pond planting areas;
- Floristically diverse and structurally similar vegetation planted at a nominal density of six individuals per square metre (m²) with the provision for areas of bare ground between plantings;
- Plant species to reflect the local Ecological Vegetation Class (EVC) and include, where appropriate, native vegetation including Common Spike-sedge *Eleocharis acuta* (in low densities to prevent spreading), rushes *Juncus* spp., Tussock Grasses *Poa* spp., and other fringing and emergent plant species (Appendix 2). High density planting is not encouraged as GGF seek refuge under rocks and timber debris;
- A selection of large concave (300-1500 millimetres in diameter) and small (3-5 boulders/square metre) rocks, extending at least one metre into the entry zone;
- Rock mattresses, covering approximately 20% of the bank area, as alternative refuge and overwintering sites (Wilson 2003) around the pond margins, along connection routes between adjacent ponds, and leading up to any culverts; and,

- Rock piles and large woody debris around the outer pond margins and dense areas of rocks and logs along the banks, extending a minimum of five metres from the water's edge. Exposed rocks retain heat more readily and are beneficial to frogs compared to cooler shaded sections (i.e. the species is known to use rocks for thermoregulation). Woody debris provides additional refugia and attracts invertebrate prey. The location and spacing of refugia should vary to optimise microhabitat diversity.

Entry Zone

This zone refers to the edge of the pond where frogs enter the water. The zone will be subject to frequent drying and will require the planting of flora species capable of tolerating fluctuating water levels. The zone should incorporate the following structural features (Appendix 3):

- A profile length of at least one metre;
- A shallow 1:8 grade slope containing a variety of rocks and logs from the bank, with rocks down to at least one metre below freeboard water level; and,
- Plantings should extend from 0-0.25 m below the water level. Terrestrial and aquatic species should be planted at a density of six plants per square metre, incorporating fringing and emergent plant species.

Embankment

This zone should provide a variety of aquatic vegetation, i.e. emergent (low density), submergent and floating plants (higher densities), for frog courtship, egg-laying, metamorphling/ tadpole cover and territorial displays. Typical aquatic vegetation include Tall Spike-rush *Eleocharis sphacelata*, Water Ribbon *Triglochin procerum*, Water plantain *Alisma platago-aquatica*, and submergent or floating aquatic vegetation including Floating Pondweed *Potamogeton tricarinatus*, Nardoo *Marsilea drummondii*, and White Purslane *Neobassia proceriflora* (see Appendix). The zone should be created to incorporate the following structural features (Appendix 3):

- A profile length of at least five metres;
- A 1:2.5 grade slope abruptly steepening (variable grade) in the final approach to the adjacent deep water zone;
- A planting area extending from 0.25-0.5 m below the water level;
- Plantings at a nominal six individuals per square metre for semi-aquatic plants and three per square metre for aquatic plants (submergent species) to a depth of 0.5 m; and,
- Within 1-3 years the zone should support at least 50% submergent, 40% emergent and 20% floating vegetation.

Deep Water Zone

This zone serves to act as a reservoir for open water during extended periods of drought/ dry weather conditions, and for larval development and successful recruitment to occur during suitable breeding conditions. This zone should include the following features (Appendix 3):

- A zone at least 5 x 10 m in area, with a minimum depth of 1.5m and up to 4m where possible, and a flat bottom;
- Planting of submergent and floating vegetation. However, no planting of emergent vegetation such as Cumbungi and/ or Common Reed to prevent the pond from being choked; and,
- Ultimately should support at least 30% submergent vegetation, predominantly comprising *Potamogeton* spp. within 1-3 years.

Vegetation Netting

It is highly recommended that any newly planted vegetation be protected by appropriate vegetation netting, to allow the vegetation to become established, and subsequently increase the habitat suitability for GGF.

Vegetation of waterbodies is an important requirement of landscaping which will ultimately determine the suitability of the wetlands for GGF. Newly vegetated waterbodies are particularly vulnerable to damage caused by various species of waterfowl, which use the vegetation for foraging, roosting and nesting sites, and cause extensive damage through trampling.

4.6.3 Design Considerations: Waterway Re-alignment

The principals of GGF habitat feature design should be applied to the realignment of the McGregor road drain and the creation of stream habitat. In addition to the above, waterway realignment should proceed with the following considerations:

- Undertake creek realignment during the dry season (summer-autumn) to reduce the likelihood of large water flows through the waterway when the soils are most unstable;
- Line creek banks with rock material or Geofab to increase bank stability and reduce erosion;
- Revegetate creek banks as soon as possible after realignment to increase bank stability (using plant species consistent with the local creek line EVC);
- Replace any in-stream habitats (e.g. rocks, branches, other snags, etc.), or introduce these features if waterways were modified and key features were absent;
- Pool, riffle, run morphological features should be retained to their current lengths and depths, or introduced if waterways were modified and these features were absent; and,
- Pre, during and post ecological monitoring (including water quality and macroinvertebrates) should be implemented.

4.6.4 Monitoring

Pre-construction monitoring for the GGF population, tadpoles and water quality must be undertaken as described in Section 4.

4.7 Development Phase

4.7.1 *Waterway and Dam Removal*

Waterways (i.e. McGregor road drain) and farm dams must be drained and allowed to dry out for a minimum of three days (during dry weather) prior to their removal. This is to allow resident fauna to relocate itself to other habitats.

It is preferable that waterways and dams are drained after the diverted creek and wetlands have been allowed a period of establishment to ensure alternative habitat is available at all times throughout the development process.

Waterways and dams may be removed after the requisite drying period. Salvage and translocation may be deemed appropriate during topsoil removal, see Section 2.3.

4.7.2 *Frog Salvage and Translocation*

GGF relocation may be acceptable if it occurs within a continuous habitat patch (e.g. along the McGregor road drainage line), or within 100 metres of the salvage site (e.g. Toomuc Creek). The requirement for salvage and translocation activities must be determined in consultation with DELWP prior to works being commenced. If salvage is determined to be a requirement for the project, procedures should follow as outlined below.

Salvage requirements

Any frogs encountered during salvage operations will be removed from the study area and released at a predetermined translocation site in the immediate area. This site will be determined in consultation with DELWP prior to works being commenced. The salvage and translocation measure outlined below will be undertaken if GGF are detected within either of the dams or the waterways in the study area.

- Salvage measures will be undertaken by a qualified zoologist experienced with salvage operations;
- Salvage will take place prior to site disturbance but as close as possible to proposed development periods;
- Salvage will involve an observer actively searching soil, vegetation and other ground debris for frogs immediately prior to, and checking under boulders that may be shifted during excavation;
- Contractors will be made fully aware of the appearance of GGF, via a site induction by a qualified herpetologist to the contractor to describe GGF and how to identify them if they are found during development;
- If a suitably qualified herpetologist/zoologist is not present during development, contractors will be required to contact a nominated person immediately should any frogs be located;
- Any specimens would need to be stored in an appropriate container and kept in a cool place out of direct sunlight until a qualified herpetologist/zoologist arrives; and,
- Salvage procedures will be conducted in accordance with the hygiene protocol for the control of disease in frogs (NPWS 2008).

Translocation protocol

Owners of the translocation sites need to be notified and an agreement made to ensure that future land use and management does not compromise the longevity of the species within the site. Ideally, this should be in the form of a letter of support. Additionally, the chosen translocation sites would need to be agreed upon by the proponent and DELWP.

Any frogs encountered during salvage will be handled in the following manner:

- Prior to release, morphological data including body size, sex and reproductive condition will be recorded for all frogs captured;
- Frogs will be translocated as soon as practicable after capture;
- Frogs will be released at night, into favourable micro-habitats such as areas containing rocks or dense vegetation around the perimeter of a water body where there is sufficient cover;
- Translocation will consider the potential spread of diseases (Chytrid Fungus), and impacts upon GGF and other frog populations at translocation sites; and,
- Any visibly sick or dying specimens will not be translocated and will be kept for further analysis to determine if infected with Chytrid Fungus.

4.7.3 Fencing

Frog Drift Fencing

Drift fencing must be used along the edges of any wetlands/waterways and ponds to prevent GGF from accessing any race tracks within the proposed Cardinia Motorsport, Recreation and Education complex. The following are recommendations for the design of frog fencing in the development zone (an example is shown in Plate 3):

- Fencing must be installed prior to any impacts on the existing waterways and prior to salvage and translocation measures to prevent frogs entering the development site and to prevent any translocated individuals from migrating back to the development site;
- Either a solid (preferred – concrete or UV resistant plastic) or a mesh structure could be used. The solid structure could be constructed with concrete or other material, while durable mesh is commercially available;
- Fencing must be 1 metre high with an additional 0.2 metres below ground and a 0.2 metre section at the top angled outwards (away from the road) and downward from horizontal;
- Fencing must be erected along the edge (10 metre buffer from the edge of any waterbody) of ponds and wetlands/waterways either running parallel, or at a 45 degree angle to the road verge to prevent frogs entering the road pavement;
- Rock, wood and logs, and other debris may be placed along likely dispersal routes to provide temporary sites of refuge, at least one metre away from the fence; and,
- Vegetation within 0.5 metres of the drift fencing will be less than 0.5 metres high.

Safety Fencing

At the completion of development, a safety audit may be required to establish whether safety fencing is needed to prevent unauthorised access into the wetland areas. Fencing may be required around any pond or wetland exceeding one metre in depth for safety purposes.

Integration of safety fencing and frog drift fencing will also be considered, as a single fence which achieves the purposes of safety, unauthorised access prevention, and a barrier for preventing frogs accessing paved areas is achievable and preferable in terms of functionality, aesthetics and maintenance.



Plate 3. An example of fencing designed to prevent frog passage beyond the wetland/waterway

4.7.4 Signage

Appropriate signage may be deployed to notify people of the presence of GGF in specific areas and to restrict entry to the wetland areas.

4.8 Post-Development Phase: Ongoing Management and Monitoring

Management and monitoring refers to procedures which may be implemented as soon as the GGF EMP for the development has been approved. The 'Post Development' stage, which is referred to in this section, relates to the stage following the completion of supplementary GGF habitat and diversion of the waterways. At this stage of the development, the EMP will focus on monitoring and management of the constructed wetlands such that the dynamics of the wetlands also contain features suitable for use as habitat by GGF. All monitoring procedures detailed in this section should be undertaken in the created wetlands.

4.8.1 Water Quality

Two upstream and four downstream water quality monitoring sites will be established prior to impacts to existing waterways. Water quality sampling will adhere to the EPA's reference document: *A guide to the sampling and analysis of waters, wastewaters, soils and wastes* (EPA 2000), which can be found on the web

at www.epa.vic.gov.au. Water quality results will be compared to the State Environment Protection Policy (SEPP) Waters of Victoria (WoV) objectives (EPA 2003).

A monitoring program will be designed in order to determine any potential risks to water quality as soon as conditions deteriorate from the background (pre-construction) water quality concentrations and from upstream sites (during construction). Management actions will be implemented if chemical spills are detected or if there is a noticeable deterioration in water quality. Several 'Spill Response Kits' will be provided if an oil or fuel spill occurs, appropriate training will be provided on how to use the kits if a spillage occurs on site.

If water quality results upstream of the construction zone exceed trigger values or are outside SEPP (WoV) objectives (EPA 2003), then water quality is likely to have been affected by unrelated catchment issues. If water quality results downstream of the construction zone exceed trigger values or are outside SEPP objectives, works will be ceased and appropriate mitigation measures implemented, until the cause of the problem is determined.

If any downstream trigger values are breached (and upstream values are not), weekly water quality monitoring will also be implemented. Weekly monitoring will be undertaken until the water quality conditions return to background conditions or within SEPP (WoV) objectives (EPA 2003).

Site Specific Trigger Values

Trigger values will be established and based on pre-construction water quality conditions at both upstream and downstream sites. Given that there is no long-term water quality data for waterways within the study area, the following trigger values should be used;

- Turbidity >20% background condition;
- Electrical Conductivity > 1% background condition;
- Dissolved Oxygen Concentration <1% background condition;
- pH ± 0.5 pH unit from background condition; and,
- All other water quality parameters (including any nutrients or heavy metals) have not substantially exceeded background conditions (i.e. no statistically significant difference ($\alpha > 0.05$)).

4.8.2 Management and Maintenance

The ongoing maintenance of wetlands is to be conducted, in particular the maintenance of aquatic vegetation diversity and structure and terrestrial habitats as this will be essential to ensure these habitat types become and remain suitable for GGF. Once established, wetlands are expected to primarily be self-sustaining.

The following will need to be undertaken as part of habitat maintenance:

- Maintenance of created habitats will take place every six months for the first two years post habitat and vegetation installation, and on an annual basis thereafter;
- If necessary, additional plants will be planted to ensure that waterbodies and terrestrial habitats remain suitable;

- Additional refuge sites such as rocks, logs and dense low-lying vegetation will be added if it is considered, during site monitoring, that the area of shelter is insufficient;
- Routine maintenance of grassed areas within the reserve area around the periphery of the waterbodies;
- The control of pest animals such as foxes and cats will be undertaken in accordance with local government laws and relevant legislation;
- Wetlands will be kept free of predatory fish, such as Plague Minnow and Redfin, where possible. The ongoing monitoring program will identify invaded ponds and subsequently instruct managers that draining is required;
- Where possible, weeds will be controlled by hand or with the use of implements. Alternatively, a frog sensitive herbicide (non-residual herbicide) will be selectively used. The use of other herbicides or pesticides within, or in close proximity to ponds, wetlands/waterways, shelter sites and likely dispersal areas will be prohibited;
- Building material and other unwanted materials (e.g. plastic, polystyrene) will be removed from wetlands/waterways and ponds. The removal of rubbish is particularly important over the first few years during pond and wetland establishment; and,
- Where relevant gross pollutant traps and/or sediment filters will be checked and, if necessary, subsequently cleaned, particularly after heavy rain or storm events.

Long Term Wetland Maintenance

The clean out of wetlands will typically be required every 15–20 years to remove sediment and build-up of organic material, or as considered necessary from annual habitat monitoring inspections. For this purpose, ponds and wetlands/waterways will have a low invert drain with a valve to draw down the water level where possible.

Clean-out will only be undertaken once ponds and wetlands have been assessed by a water quality expert and it is determined that sediment build-up and organic matter has accumulated to the point necessary to require clean-out. Clean-out will be undertaken in a staged approach (i.e. cleaned out gradually over a couple of years).

Prior to wetland clean-out, a suitably qualified zoologist will be consulted to give advice in relation to the appropriateness of such actions in terms of the potential impacts the operations may have on tadpoles in ponds and/or resident frog populations. Wetlands must be re-established with a diversity of wetland plants and refuge sites if these habitat features are disturbed during the draining process.

5 MITIGATING OTHER ENVIRONMENTAL IMPACTS

5.1 Environmental Site Induction

5.1.1 Pre-construction

All construction staff on site (i.e. the area of construction) will be made aware of this EMP and their responsibilities regarding environmental management. As such, all staff will attend an environmental site induction, which will inform contractors of the requirements of this EMP. All main contractors undertaking construction works will be provided with a copy of the EMP prior to commencement of works. The main contractors must issue sub-contractors with a copy of the document prior to commencement of works to allow time to become familiar with the document and guidelines/procedures.

Following the induction, all persons working on site are required to sign the induction form and a log will be kept of all staff that have completed the environmental site induction. All construction personnel will hold appropriate competencies/ qualifications for their intended role. A summary of actions and timings of the induction is provided in Table 6.

The induction will include the following:

- Information about the environmental values present within and surrounding the study area;
- A site plan will be provided for viewing in order to become informed on environmental values;
- The legislative context of the development;
- The key objectives and measures outlined in the EMP;
- The duty of care of all persons to: protect the environmental values within and surrounding the study area; ensure that their actions are in accordance with the relevant environmental legislations and policies, and the EMP; and report any faults, issues or actions with the potential (even if remote) to impact upon the environment;
- The hierarchy of environmental responsibility and the lines of reporting;
- The reprimand and penalties of non-compliance; and
- The requirement for all persons inducted to sign a log book of induction.

Table 6. Summary of actions, timing, objectives, key responsible person/s and performance indicators for the environmental site inductions

Action	Timing	Key objective	Responsible person/s	Performance indicator
Environmental site inductions for all businesses, managers, contractors, subcontractors, consultants and staff.	Pre and during construction.	Ensure all persons are informed and aware of environmental values, duty of care and the CEMP.	Head Contractor's Project Manager.	Record of inductions in log book.

5.1.2 *Monitoring and reporting*

- A log is to be kept of all staff that have completed the environmental site induction.
- All site changes that affect environmental protection, whether they are a directly or indirectly as a result of development will be logged at each toolbox meeting.

5.2 Erosion and Sedimentation

Construction activities (e.g. soil excavation, vehicle storage and movement) may increase the potential for erosion and sedimentation and can pose a significant risk to water quality and site ecological values.

Measures employed for dust suppression are also effective as erosion and sedimentation controls. In addition to the measures outlined for dust suppression (Section 5.3), the following measures may be appropriate to reduce erosion and sedimentation (EPA 2004a):

- Install sediment retention structures to divert flow away from exposed soils and prevent contaminated stormwater from accessing waterways. Such structures will include either or a combination of silt fences, sand bags, coir logs, rock or gravel, catch drains, earth banks, slopes or batters and rock bunds. A wide range of sediment retention structures are described in detail in EPA (2004a);
- Ongoing sediment and erosion control: permanent stormwater protection through ‘water-sensitive urban design’ principles will be incorporated within the detailed design phase of the development; and,
- Construction stockpiles, machinery and equipment are located at least **30 metres** from the No-Go Zones, and at least **10 meters** from waterways to limit the potential for direct impacts associated with vehicle storage, sediment and erosion.

5.2.1 *Monitoring and reporting*

All sediment controls implemented will be checked on a weekly basis, and after any major rain events, to ensure controls are working effectively. The site contractor will be responsible for implementation of erosion and sediment controls including monitoring and reporting of their effectiveness.

5.3 Dust

Dust is generated through exposure of dry soils and agitation through either construction activities (e.g. moving soils, vehicle and machinery movements) or by high wind speeds that enable soil particles to become airborne.

Construction activities and exposure of topsoil is likely to increase dust levels, which can pose a hazard to human health, water quality and vegetation function. Dust pollution may also impact on the visibility of drivers on adjoining roads (i.e. McGregor Road). The following measures will be implemented to reduce dust levels during construction (EPA 2004a):

- Phase the work program to minimise land disturbance and retain vegetation where possible throughout the construction period;
- Stabilise exposed soil (stabilisation matting, grassing, mulch, progressive revegetation, roughen surface of exposed soil);
- Watering exposed soil and access tracks using non potable water. Frequency of watering will be determined by weather conditions (e.g. dry, windy days likely to generate more dust), with a watercart to be maintained on site during dusty conditions;
- Vehicles to keep to paved roads wherever possible and reduce traffic speeds on access tracks; and
- Protect soil stockpiles by applying the following measures:
 - Cover stockpiles with geotextile, stabilisation matting or other suitable material (where practicable);
 - Provision of silt fencing on the low side of each stockpile;
 - Minimise the number and size of stockpiles;
 - Maximum 2:1 height to width ratio for soil stockpiles; and
 - Vegetation (sterile grasses) to be established on stockpiles that have been exposed for more than 28 days.

5.3.1 *Monitoring and reporting*

Dust controls are to be checked on a weekly basis from May to September (construction period) when dust exposure is at greatest risk, to ensure measures remain in place and are working effectively.

The site contractor will be responsible for implementation of dust controls including monitoring and reporting.

5.4 **Vehicle Access and Transport of Materials**

Any vehicle depositing materials on site will be inspected by construction personnel (e.g. site supervisor) prior to being permitted to enter.

This inspection will involve the identification of materials on board to ensure no unauthorised materials are entering the site, such as contaminated fill, weeds, illegal dumping, etc. Any certified materials (i.e. clean fill) should have an accompanying certificate from the supplier to confirm that all items being used on site have been certified and approved by a certified company.

Where large loads (i.e. loads exceeding the height of the container) are entering and/or exiting the site, they will be covered (i.e. tarp) or bound (i.e. webbing straps) appropriately. This will avoid any debris littering surrounding areas or causing accidents/injuries.

Any vehicles entering will follow the pest plant management procedures, as identified in Section 3.5 above.

Haul roads will be clearly identifiable and used at all times. Vehicles will drive at a slow and safe speed and well within the legal speed limit.

Rumble strips are to be installed at vehicle access points to dislodge excess mud and prevent tracking onto the Princes Freeway.

5.4.1 Monitoring and reporting

The site contractor will maintain a log of all vehicles and machinery permitted to enter the construction site. Access points are to be cleared on a weekly basis to prevent mud build-up surrounding rumble strips. Any contraventions of the control actions for vehicle access and transport will be reported to the site contractor.

5.5 Chemical Storage and Operational Failure

Fuels, lubricants and chemicals may be stored on site during the project. To avoid the risk of spills contaminating the environment including off-site receptors, the following measures will be implemented:

- All chemicals and fuels will be stored in an appropriate location at least 100 metres away from waterways and No-Go zones;
- All chemicals and fuels will have appropriate Safety Data Sheets (SDS) available at all times within the relevant storage compartment;
- The storage area will be surrounded by an air and water tight barrier to minimise risk should any spillage occur. The barrier will be at least 700 mm high and entirely sealed at ground level to safeguard against any leaks. The barrier will have capacity to hold double the volume stored in the onsite fuel storage tank;
- The storage area will be clearly designated and signed;
- Appropriate bunding and liners for chemical storage will be installed in case of spillage;
- Fuel spill response plans will be prepared. A spill kit will be kept approximately 10 metres away from the fuel storage area so that it is accessible in the event of a spill, but safely out of the range of spills (EPA 2004a);
- Potential pollutants present on site and the protocols for storage, transportation, handling and disposal of pollutants, reporting procedures of risks, and emergency procedures in the event of a spill, will be covered during the environmental site inductions; and
- In the event that fauna have been, or may be, directly impacted by the spill, wildlife rescue and assistance will be organised.

5.5.1 Monitoring and reporting

All spills will be reported by the site contractor, including documentation identifying the cause of the spill, actions taken, the outcome and what actions are proposed to avoid a repeat spill. The site contractor will assess whether EPA needs to be notified if there has been any potential contamination of soil or waterways.

The site contractor will undertake weekly inspections of spill controls to ensure they are adequately maintained and effective.

5.6 Waste Management

Construction activities may involve the use of fuels, lubricants, chemicals and construction waste materials that pose a risk to soil, waterways and groundwater contamination. The following actions will be implemented to address these risks:

- A designated set down area for vehicle and equipment storage, vehicle refuelling and dumping of contaminated waste (where applicable) will be established prior to commencement of construction activities. In accordance with EPA guidelines (EPA 2004) the area will be:
 - Located 100 meters away from drainage lines, stormwater inlets, areas of significant flora and fauna and other sensitive areas identified on site;
 - appropriately bunded to contain all contaminated water; and
 - clearly signed for easy identification.
- All waste material will be contained (within suitable skips onsite) and emptied on a regular basis to ensure skips do not overflow and litter does not enter surrounding residential areas;
- Appropriate methods of disposal for wastes are dependent on the classification of the waste material and are detailed in Classification of Wastes (EPA 2008c); and
- The site contractor will be made aware of their responsibility to keep the construction zone clean during construction.

5.6.1 *Monitoring and reporting*

All incidents involving inadequate equipment storage or spillages will be reported immediately and the management of waste material must be adjusted to ensure storage procedures are appropriate.

5.7 Fire Management and Emergency Procedures

The risk for a fire to start and spread within the site is high due to the presence of grassland vegetation which dries in summer and can carry a fire on a hot, windy day. The contractor will undertake the following safety procedures to minimise the risk of fire.

- All vehicles and machinery will be parked in designated parking areas (where appropriate) on bare ground;
- A designated emergency assembly area is to be implemented;
- All staff will be made aware of the declared Fire Danger Period and days of Total Fire Ban. Works that are prohibited on Total Fire Ban days will not be undertaken. A risk assessment will be carried

out as part of the pre-start Toolbox meeting to determine if other construction activities should not proceed;

- Adequate fire suppression equipment will be on site as per the requirements of Regulation 109 and 110 of the Country Fire Authority Regulations 2004. The contractor's personnel will be made aware of the location and operation of this equipment; and
- The Construction Supervisor will be supplied with the contact number for the local CFA unit, and police station in the case of an emergency.
 - Country Fire Authority (CFA) rescue service, District 08 (South East Region)
 - Address: 11 John Street, Pakenham, Victoria 3810
 - District 08 phone: (03) 9767 1800
 - CFA Headquarters phone: (03) 9262 8444
 - Emergency phone: 000
 - Pakenham Police Station
 - Address: 780 Princes Hwy, Pakenham, Victoria 3810
 - Station phone: (03) 5945 2500
 - Emergency phone: 000

5.7.1 *Monitoring and reporting*

The site contractor will have the contact number for the local CFA unit.

Any fire outbreaks will be reported to the CFA once unsafe to suppress. Any fire will be logged as a safety incident and reported to the OH&S representative within 24 hours.

5.8 Noise Management

A detailed report into noise considerations for the proposed development has been completed by Marshall Day Acoustics (Marshall Day Acoustics 2019), which includes a noise assessment and noise management plan.

5.9 Incidents and Complaints

An Incident and Complaints register will be established and maintained by the head contractor. Any incidents of non-compliance with the EMP will be recorded and Podium 1 (or relevant permit holder) will be notified (and relevant environmental regulator if necessary) as soon as possible.

Any complaints received will be recorded in the same register. The head contractor will notify Podium 1 (or relevant permit holder) of any complaints received as soon as possible, and Podium 1 (or relevant permit holder) will be responsible to provide a response. The register will include a record of when the complaint was received, the nature of the complaint, when it was responded to, by whom and how.

6 MONITORING, AUDITING, ADAPTIVE MANAGEMENT AND REPORTING

6.1 Monitoring responsibility

Monitoring will be undertaken to assess compliance with the EMP and that the magnitude of impacts are within the approved limits.

There will be ongoing monitoring of the site by a representative of the head contractor who is aware of the prescriptions of the EMP. The head contractor may also sub-contract aspects of monitoring including specific tasks, such as water quality monitoring, if there is no available expertise within their organisation.

6.2 Auditing

Podium 1 (or relevant permit holder) will undertake random audits periodically throughout the project, and during or after any major corrective actions or remediation works. They will also audit the head contractor to ensure the Incident and Complaint register is being maintained, training and awareness programs are being rolled out, and the monitoring is being undertaken as scheduled. The head-contractor will audit any sub-contractors on a periodic basis to check general environmental performance and compliance with relevant sub-plans of the EMP.

Environmental regulators may undertake audits during construction phase.

An independent auditor will be engaged to review compliance with the EMP, whether the EMP is mitigating environmental impacts as intended, and whether any changes to the EMP or its implementation are required.

6.3 Adaptive Management

Mitigation and avoidance measures have been developed as part of this EMP that are intended to reduce the risk of the project impacting the environment. In the unlikely event that the monitoring shows that the impact has exceeded the performance indicator, the proposed management actions would need to be revised. Any changes to environmental management will be proposed as part of the annual EMP report. Changes to environmental management will only be proposed if the performance indicators outlined in the EMP are exceeded within the twelve-month reporting.

Any approved changes to environmental management will be incorporated into a revised EMP.

6.4 Reporting

An annual EMP report will be prepared and submitted to Podium 1 (or relevant permit holder) throughout the construction phase of the project. The report will include:

- List of actions from the EMP that have been implemented.

- Details of any non-compliance.
- Results of water quality monitoring.
- List of complaints received from adjoining residents (if any).
- Number of staff that have completed environmental site inductions.
- Any unexpected impacts to the environment that was not adequately accounted for.
- Any corrective actions implemented.

7 RESPONSIBILITIES FOR MANAGEMENT

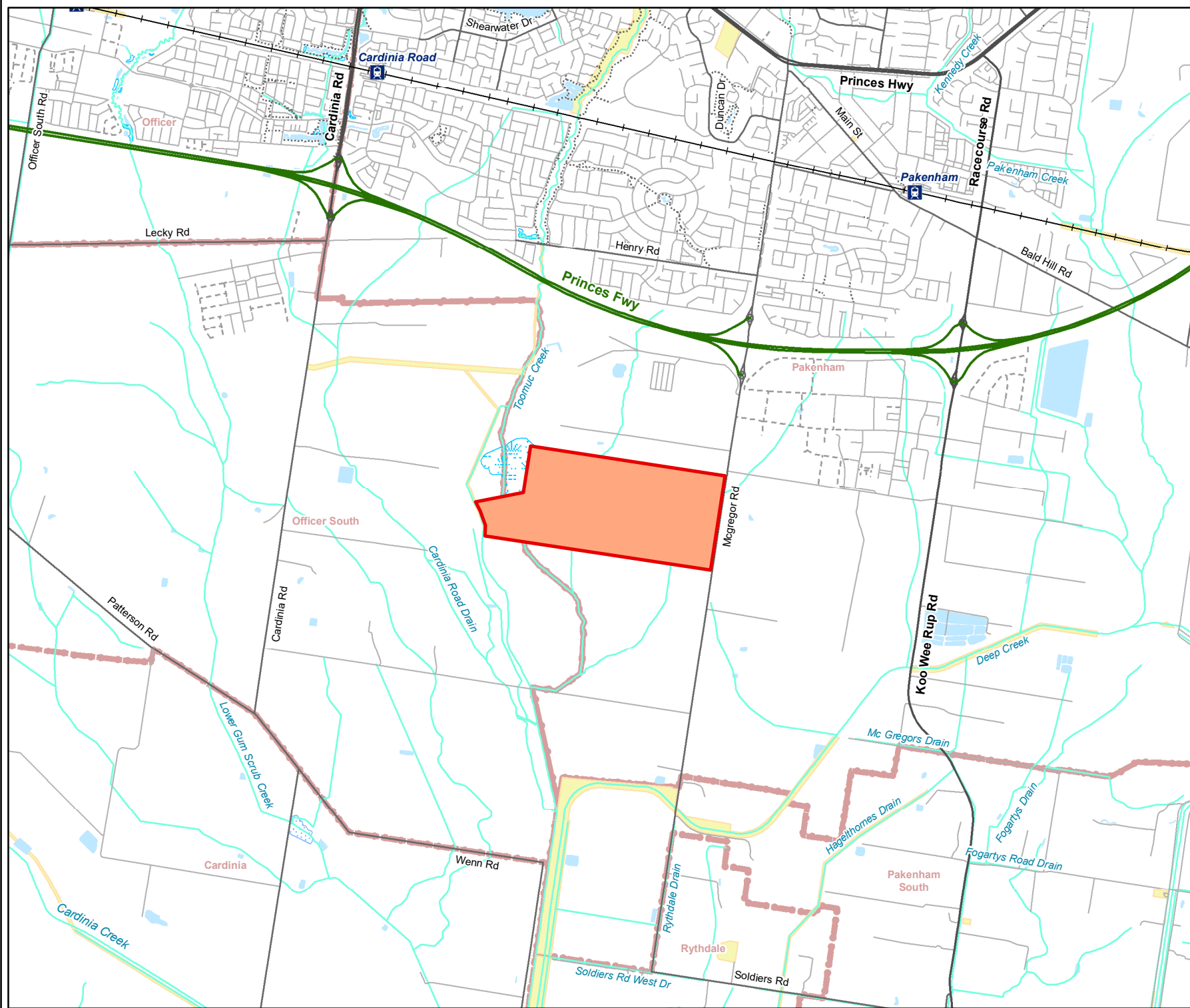
The actions contained within this EMP will be the responsibility of the relevant planning permit holder to each Lot (due to the EMP being a requirement of the DPO16, however Podium 1 not developing the entire DPO16 area), and will involve;

- Ensuring all actions are undertaken in accordance with this EMP; and,
- Completion of a report detailing outcomes of all actions undertaken in accordance with this EMP. The report will be submitted annually for the first four years post-development, then in years 6, 8 and 10.

REFERENCES

- Ashworth, J.M. 1998. An appraisal of the Conservation of *Litoria raniformis* (Kefferstein) in Tasmania. University of Tasmania March 1998. Unpublished Masters thesis.
- Barker, J., Grigg, G.C. & Tyler, M.J. 1995. A Field Guide to Australian Frogs. Surrey Beatty & Sons. New South Wales.
- Cogger, H. G (Ed). 1996. Reptiles and Amphibians of Australia. 5th Edition. Reed Books Australia, Victoria.
- Cogger, H. 1996. Reptiles and Amphibians of Australia. Reed Books, Sydney.
- DELWP 2017a. Guidelines for the removal, destruction or lopping of native vegetation. The State of Victoria Department of Environment, Land, Water and Planning. Melbourne, December 2017.
- DELWP 2017b. Growling Grass Frog Habitat Design Standards. The State of Victoria Department of Environment, Land, Water and Planning. Melbourne, Victoria.
- DELWP 2018. Victorian Biodiversity Atlas. Sourced from GIS layers: "VBA_FLORA25", "VBA_FLORA100", "VBA_FAUNA25", "VBA_FAUNA100", June 2018. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2019. Native Vegetation Information Management Tool [www Document]. URL: <<https://nvim.delwp.vic.gov.au/>>. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DEPI 2013a. Biodiversity Conservation Strategy for Melbourne's Growth Corridors. Victorian Government Department of Environment and Primary Industries, Melbourne.
- DEPI 2013b. Sub-regional Species Strategy for Growling Grass Frog. Department of Environment and Primary Industries, Melbourne, Victoria.
- DSE 2013. Advisory list of Threatened Vertebrate Fauna in Victoria – 2013. Victorian Department of Sustainability and Environment, Melbourne, Victoria.
- DSE 2010. Biodiversity Precinct Structure Planning Kit – May 2010. Available from URL: www.dse.vic.gov.au/biodiversitykit. State of Victoria, Department of Sustainability and Environment (DSE).
- Ecology and Heritage Partners 2019. Biodiversity report for proposed Cardinia Motorsport, Recreation and Education Centre at 15, 21 and 115 Key Lane, and 335 McGregor Road, Pakenham, Victoria. Unpublished report for Podium 1.
- EPA 2003. State Environment Protection Policy: Waters of Victoria. Environment Protection Authority Victoria, Melbourne.
- Hamer, A.J., Lane, S.J. & Mahony, M. 2002. Management of freshwater wetlands for the endangered Green and Golden bell frog *Litoria aurea*: roles of habitat determinants and space. Biological Conservation 106: 413–424.

- Heard, G., Scroggie, M.P. and Clemann, N. 2010. Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes. Wildlife Ecology Arthur Rylah Institute for Environmental Research, Heidelberg, Victoria.
- Heard, G.W., Robertson, P. and Moysey E.D. 2004. Management Plan for the Growling Grass Frog *Litoria raniformis* within the 'Fairway Waters' development, Pakenham, Victoria. Unpublished report by Wildlife Profiles Pty Ltd. and Ecology Australia Pty Ltd for to Westmont Holdings Pty Ltd & Simons Builders Pty Ltd.
- Hero, J.M., Littlejohn, M. & Marantelli, G. 1991. Frogwatch Field Guide to Victorian Frogs. Department of Conservation and Environment, East Melbourne.
- Littlejohn, M.J. 1963. Frogs of the Melbourne area. Victorian Naturalist. 79: 296–304.
- Littlejohn, M.J. 1982. Amphibians of Victoria. Victorian Yearbook. 85:1–11.
- Mahoney, M. 1999. Review of the declines and disappearances within the bell frog species group (*Litoria aurea* species group) in Australia. In: Declines and Disappearances of Australian Frogs. The University of Newcastle, Newcastle, NSW.
- Marshall Day Acoustics 2019. Cardinia Motor Recreation and Education Complex Development Plan Acoustic Review. Unpublished report prepared for Podium 1.
- Monarc 2018a. Southern Brown Bandicoot Targeted Survey Report. Monarc unpublished report prepared for APA Transmission Pty Ltd.
- Monarc 2018b. Aquatic Survey Report - Crib Point Pakenham Pipeline Project. Monarc unpublished report prepared for APA Transmission Pty Ltd.
- NPWS (National Parks & Wildlife Service) 2008, Hygiene Protocol for the Control of Disease in Frogs. Information Circular No. 6. N.S.W. National Parks & Wildlife Service, Hurstville.
- Organ, A. 2003. Growling Grass Frog *Litoria raniformis* monitoring over the 2002/03 breeding period, Western Treatment Plant, Werribee, Victoria. Biosis Research Pty Ltd unpublished report for Melbourne Water Corporation.
- Organ, A. 2004. Pakenham Bypass: Growling Grass Frog *Litoria raniformis* 2003/04 survey, Pakenham and surrounds Victoria. Biosis Research Pty Ltd unpublished report for VicRoads.
- Organ, A. 2005a. Pakenham Bypass: Conservation Management Plan for the Growling Grass Frog *Litoria raniformis*, Pakenham, Victoria. Biosis Research Pty Ltd unpublished for VicRoads.
- Organ, A. 2005b. Targeted Growling Grass Frog *Litoria raniformis* survey and management recommendations for the proposed Fairway Waters, Pakenham, Victoria. Unpublished report for Thinc Projects Pty Ltd.
- Robertson, P., Heard, G. & Scroggie, M. 2002. The Ecology and Conservation Status of the Growling Grass Frog (*Litoria raniformis*) within the Merri Creek Corridor. Interim Report: Distribution, Abundance and Habitat Requirements. Report produced for the Department of Natural Resources and Environment.
- White A. W. & Pyke G.H. 1996. Distribution and conservation status of the green and golden bell frog *Litoria aurea* in New South Wales. Australian Zoologist 30: 177–89

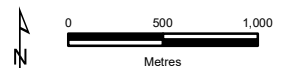


Legend

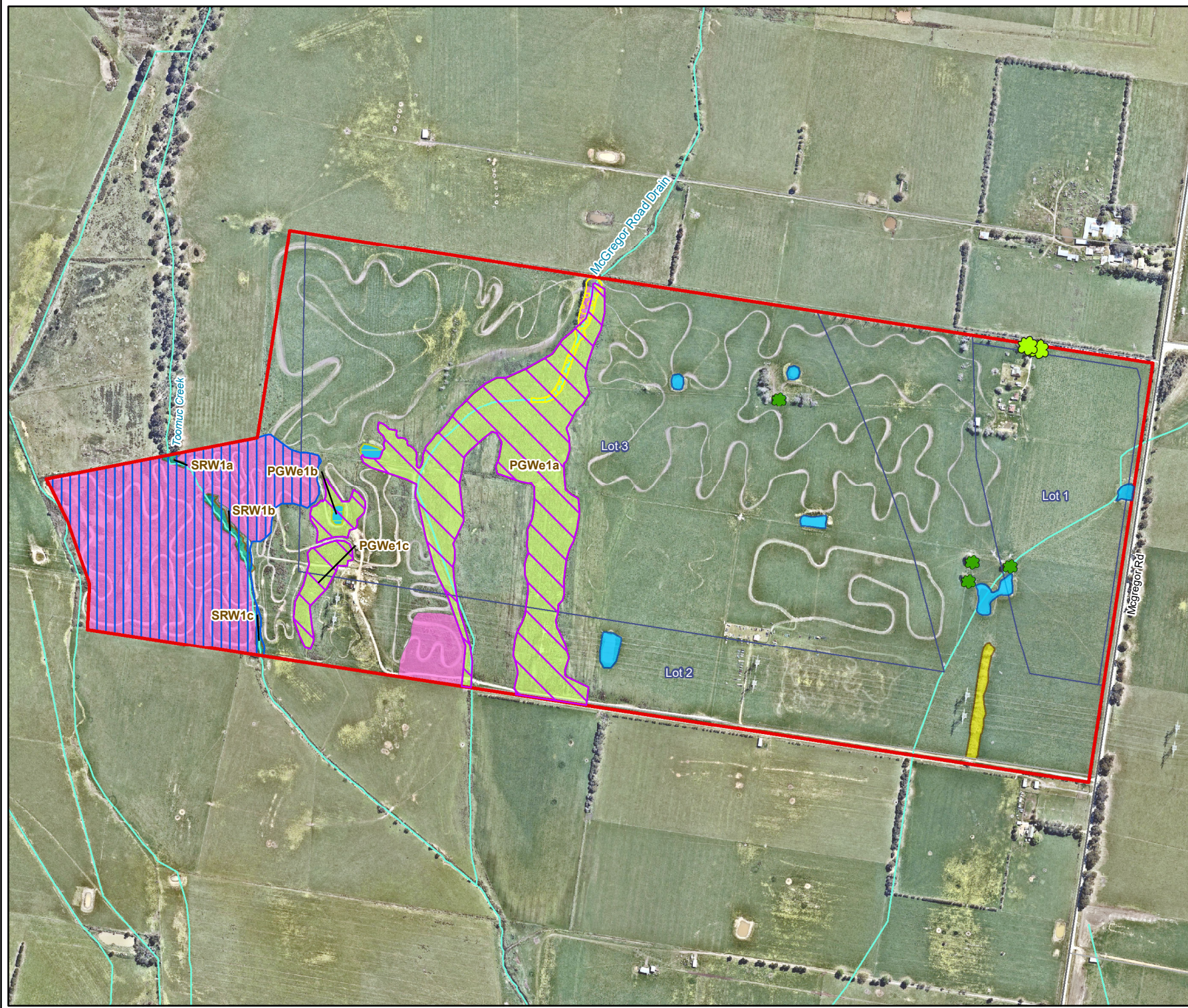
- Study Area
- Railway
- Freeway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Crown Land
- Localities



Figure 1
Location of the study area
Environmental Management Plan for 21, 75 and 115 Key Lane, Pakenham



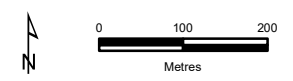
VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



- Legend**
- Study Area
 - Lot boundaries
 - Potential habitat for Southern Brown Bandicoot
 - Habitat for Growing Grass Frog
 - Juvenile & adult Growing Grass Frog located 2010
 - Dams
 - ✿ Scattered Large Tree
 - ✿ Scattered Small Tree
 - Gorse/Blackberry patch
 - Planted vegetation
- Ecological Vegetation Class**
- Plains Grassy Wetland
 - Swampy Riparian Woodland

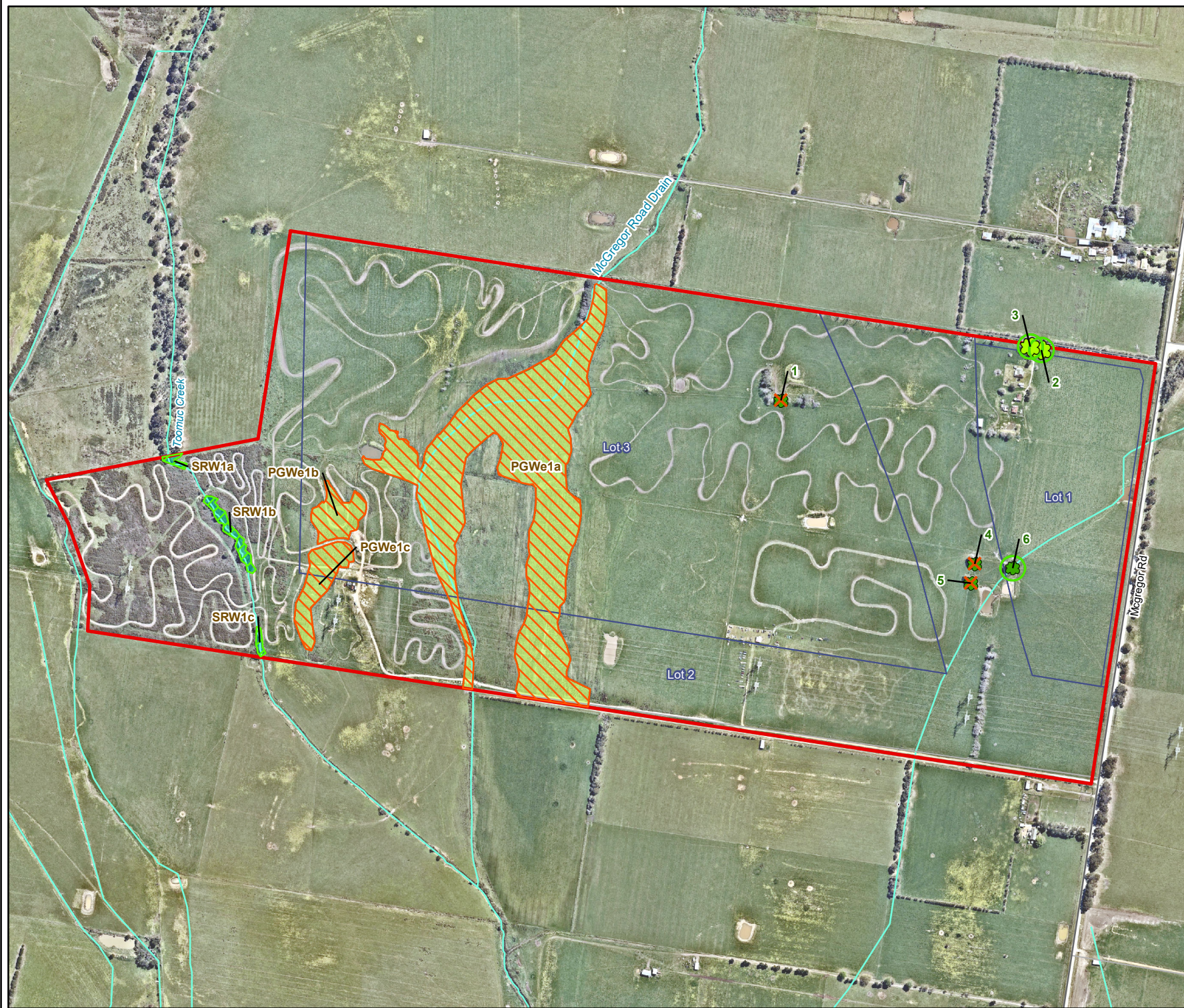


Figure 2
Ecological features and fauna habitat
Environmental Management Plan for 21, 75 and 115 Key Lane, Pakenham



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

11399_Fig02_EcoFeat_FaunaHab_18/07/2019_Melsley



Legend

- Study Area
- Lot boundaries
- ✿ Scattered Large Tree
- ✿ Scattered Small Tree
- ✕ Trees impacted (River Red-gums)
- Trees retained

Ecological Vegetation Class

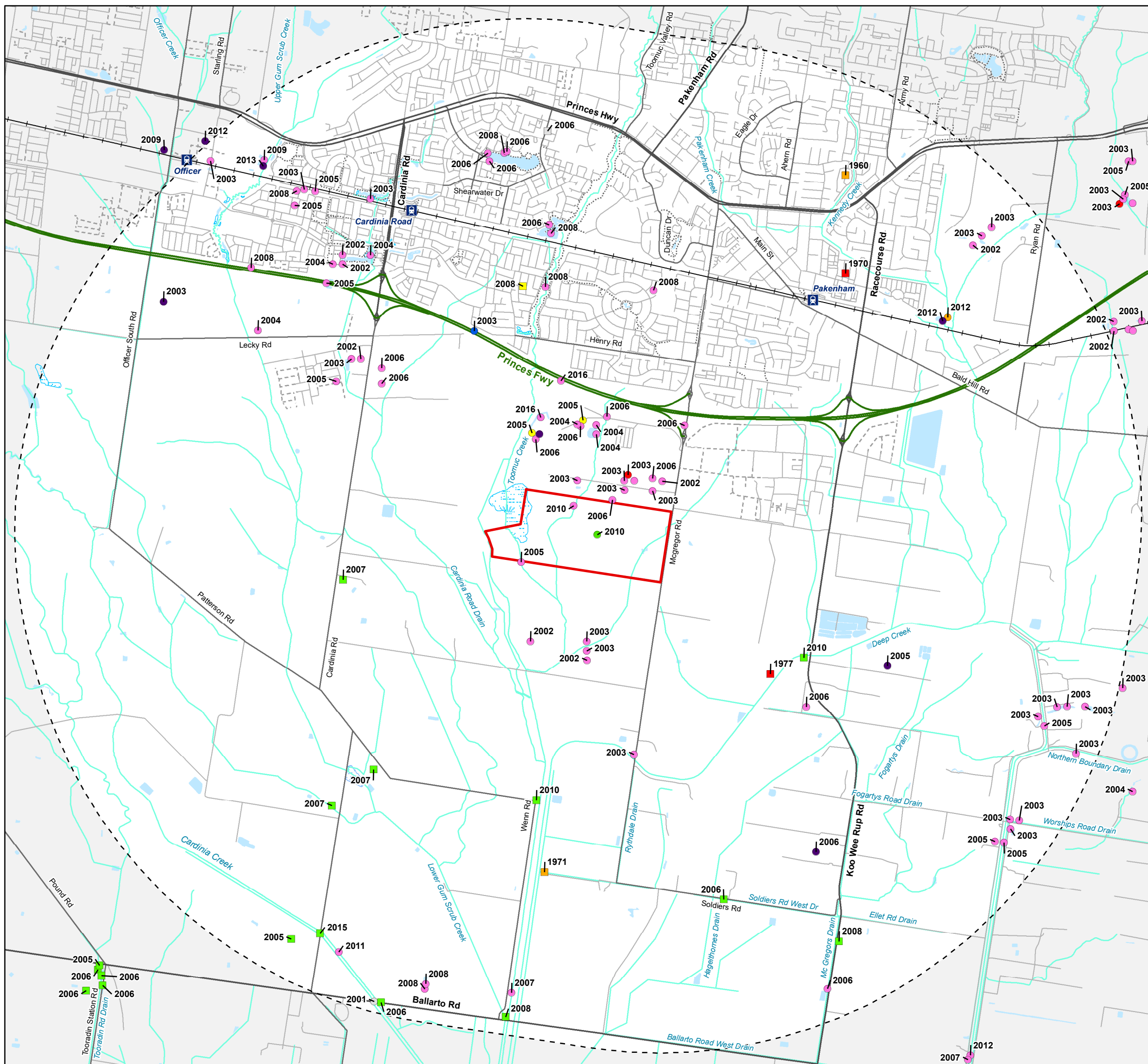
- Plains Grassy Wetland
- Swampy Riparian Woodland
- Vegetation impacted
- Vegetation retained



Figure 3
Impacted and retained vegetation
Environmental Management Plan for 21, 75 and 115 Key Lane, Pakenham



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



Legend

Study Area

Significant fauna

- Australian Grayling
- Baillon's Crake
- Eastern Great Egret
- Eastern Snake-necked Turtle
- Glossy Grass Skink
- Grey-headed Flying-fox
- Growling Grass Frog
- Latham's Snipe
- Little Bittern
- Macquarie Perch
- Murray Cod
- Nankeen Night Heron
- Southern Brown Bandicoot



Figure 4
 Previously documented significant fauna records within 5km of the study area
Environmental Management Plan for 21, 75 and 115 Key Lane, Pakenham



VBA 2018. Victorian Biodiversity Atlas // Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100'. January 2018 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

APPENDICES

Appendix 1 – Standard Procedures for the capture and release of birds, mammals, reptiles, frogs

Capture

- Animals only to be captured if deemed necessary i.e. if they are considered to be at risk of death, injury, significant distress, or displacement that leaves them vulnerable to predation.
- Animals only to be captured by suitably qualified and experienced zoologist or ecologist.
- Animals only to be captured if there is no other suitable or feasible measure to remove them from harm. If an animal is relocating itself safely (e.g. moving into adjacent vegetation out of harm's way when disturbed), it should be allowed to do so without interference. If an animal can be encouraged to relocate itself (e.g. moving a hollow that has a possum sheltered within it into adjacent vegetation out of the construction zone, for it to emerge unassisted in the evening) this is to take precedence over capture.
- Birds and mammals to be covered as soon as possible with a towel or pillow case to remove external stimuli and avoid undue stress during capture until placed in appropriate holding conditions and/or relocated.

Handling

- Birds to be handled gently yet firmly (to avoid them injuring themselves) and for the shortest time possible before being released or placed into appropriate holding conditions.
- Frogs and tadpoles are to be handled as little as possible as handling removes skin secretions and predisposes the frog to fungal infections. Zoologists to wear clean latex gloves to handle frogs. Gloved hands should be dipped in the local water or along wet grass/vegetation in the immediate area so that loss of skin secretions is minimised when frogs are first picked up. Each pair of gloves to be replaced between handling frogs to ensure no potential for transmission of disease, in accordance with the guidelines for frog handling (DECC 2008).
- Reptiles to be handled gently but firmly and for the shortest time possible before being released or placed into appropriate holding conditions.
- Small and medium mammals to be handled gently yet firmly, with appropriate gloves that prevent the Zoologist being bitten.
- Micro-bats to be handled with latex gloves, very gently and for the shortest time possible before being placed into the appropriate holding conditions.

Holding

- Birds to be held in a dark ventilated container, wrapped loosely with a towel. The container to be relative to the bird's size: large enough for it to be comfortable but not so large that it can move around too much causing injury to itself. The box will be kept in a dark, quiet, ventilated area.
- Frogs to be held in a sterile, ventilated plastic container (e.g. terrarium) with a moist sponge, and stored in a dark, quiet, ventilated area.
- Reptiles to be held in a sterile, ventilated plastic container (e.g. terrarium) and stored in a dark, quiet, ventilated area.
- Small mammals to be held in a dark cardboard box/small pet carrier with a towel or similar. The box to be relative to the animal's size for comfort and containment (as per birds). The box to be kept in a dark, quiet, ventilated area.
- Medium sized mammals (e.g. possums; flying-foxes) to be held in a secure animal handling carrier, such as a cat carrier, with a towel. The carrier will be kept in a dark, quiet, ventilated area, with an additional piece of material (such as a dark coloured sheet that still allows ventilation) over the top to reduce stress to the animal caused by visual stimulation.
- Microbats to be held in a light Calico drawstring bag, that will be hung by the drawstring (to allow bats hang upside down) in a dark, well ventilated, quiet area. No more than three bats per bag.

Releasing

- Animals are to be released into habitat nearby that is both suitable and scheduled for retention. This cannot be greater than 150 meters from capture point without prior approval from the DSE. For the relocation of frogs from wetland habitat, they must be moved into the nearest suitable habitat less than 100 metres of the point of capture.
- Ground dwelling animals (e.g. reptiles, frogs) to be released as close as possible to logs, tussocks, dense shrubs or rocks so they can find refuge immediately upon release.
- Arboreal animals (e.g. possums, birds) to be released onto nest-boxes, trees, shrubs or other suitable micro-habitats so they can find refuge immediately upon release. Where suitable habitat is not immediately evident, some mammals may be required to be held until dusk to minimise the potential for predation during daylight hours (i.e. Sugar Gliders)
- Bats are to be released on the same evening of date of capture, at the point of capture, to ensure that they are not vulnerable to predation.
- All animals to be visually monitored after release to ensure that they do not show signs of stress or vulnerability. If they do show such signs, re-capture and monitor the animal in captive conditions, seeking veterinary attention as required.

Recognition of stress indicators in captured animals

It is important for the zoologist undertaking the salvage and relocation of native fauna to recognise the indicators of mild-moderate stress in animals. Such recognition informs the judgement to intervene. The following are indicators of mild-moderate stress in animals: vocalization, fast and shallow breathing, temporarily unresponsive to stimuli (listless) and extra or reduced urination or defecation. If an animal is displaying greater than one of these indicators at the same time, or an extreme of one of these indicators, then the zoologist should prepare themselves for intervention (e.g. call for a pause on construction to suitably deal with the animal; capture the animal to place it in a dark, quiet environment to monitor; take the animal to a veterinarian, etc.).

Injured animals

- Prior to the commencement of habitat removal, the zoologist is to locate and obtain the contact details of the closest wildlife shelter and veterinarian.
- If an animal is injured or sick, the zoologist is to call for a pause on construction and immediately make arrangements for the animal to be taken care of. Depending on the severity of injury or illness, this may mean organising the animal to be transported to a wildlife shelter for rehabilitation; or to a veterinarian for medical attention or euthanasia.
- Any of the costs associated with the aforementioned action will be the responsibility of the client. If an animal is taken to a wildlife shelter (usually volunteers or non for profit organisations) this is to be accompanied by a donation to the shelter to assist in the care of the injured animal.
- In the event that an animal is severely injured and requires euthanasia immediately (i.e. on site) this is to be undertaken at the zoologists discretion using methods outlined in their Animal Ethics Permit.

Prevention of disease transmission

There is evidence to suggest that the decline of many frog species in Australia and elsewhere could be related to a disease caused by the water-borne fungal pathogen *Batrachochytrium dendrobatidis* (Chytrid fungus). To reduce the potential spread of this disease the zoologists undertaking the salvage and relocation of frogs are to follow the guidelines set out in the: “*Hygiene Protocol for the Control of Disease in Frogs*” (DECC 2008). This includes but is not exclusive to:

- all frogs to be handled with the use of latex gloves, which will be disposed of after each individual frog is handled; and
- any equipment used for salvage and relocation (i.e. waders, nets, gum boots, buckets etc.) will be dried completely between uses (minimum of 3 hours), or disinfected with a 5% active chlorine solution (e.g. Bleach) at the beginning and end of each day and between sites.

Appendix 2 – Suitable EVCs for revegetation

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 55: Plains Grassy Woodland

Description:

An open, eucalypt woodland to 15 m tall occurring on a number of geologies and soil types. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	80 cm	10 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus tereticornis</i> ssp. <i>mediana</i>	Gippsland Red-gum
	<i>Eucalyptus camaldulensis</i>	River Red-gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	2	10%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	1	5%	LH
Medium Herb	10	20%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	1	10%	LNG
Medium to Small Tufted Graminoid	9	35%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Allocasuarina littoralis</i>	Black Sheoak
T	<i>Acacia mearnsii</i>	Black Wattle
T	<i>Acacia melanoxylon</i>	Blackwood
MS	<i>Kunzea ericoides</i>	Burgan
SS	<i>Pimelea humilis</i>	Common Rice-flower
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
MH	<i>Hypericum gramineum</i>	Small St John's Wort
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
SH	<i>Dichondra repens</i>	Kidney-weed
SH	<i>Poranthera microphylla</i>	Small Poranthera
LTG	<i>Austrostipa rudis</i>	Veined Spear-grass
LNG	<i>Gahnia radula</i>	Thatch Saw-sedge
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Carex breviculmis</i>	Common Grass-sedge
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 83: Swampy Riparian Woodland

Description:

Woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levees in combination with large tussock grasses and sedges in the ground layer.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
20%	<i>Eucalyptus ovata</i>	Swamp Gum
	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	4	30%	T
Medium Shrub	5	20%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	3	5%	LH
Medium Herb	7	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	5	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	2	10%	GF
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	<i>Acacia melanoxylon</i>	Blackwood
T	<i>Melaleuca ericifolia</i>	Swamp Paperbark
T	<i>Leptospermum lanigerum</i>	Woolly Tea-tree
MS	<i>Leptospermum continentale</i>	Prickly Tea-tree
MS	<i>Coprosma quadrifida</i>	Prickly Currant-bush
MS	<i>Bursaria spinosa</i>	Sweet Bursaria
LH	<i>Senecio minimus</i>	Shrubby Fireweed
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
MH	<i>Hydrocotyle hirta</i>	Hairy Pennywort
SH	<i>Dichondra repens</i>	Kidney-weed
LTG	<i>Carex appressa</i>	Tall Sedge
LTG	<i>Cyperus lucidus</i>	Leafy Flat-sedge
LTG	<i>Lepidosperma elatius</i>	Tall Sword-sedge
LTG	<i>Juncus procerus</i>	Tall Rush
LNG	<i>Phragmites australis</i>	Common Reed
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
GF	<i>Pteridium esculentum</i>	Austral Bracken

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 125: Plains Grassy Wetland

Description:

This EVC is usually treeless, but in some instances can include sparse River Red Gum *Eucalyptus camaldulensis* or Swamp Gum *Eucalyptus ovata*. A sparse shrub component may also be present. The characteristic ground cover is dominated by grasses and small sedges and herbs. The vegetation is typically species-rich on the outer verges but is usually species-poor in the wetter central areas.

Life forms:

Life form	#Spp	%Cover	LF code
Large Herb	3	10%	LH
Medium Herb	10	20%	MH
Small or Prostrate Herb	2	10%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	2	10%	LNG
Medium to Small Tufted Graminoid	10	20%	MTG
Medium to Tiny Non-tufted Graminoid	4	10%	MNG
Bryophytes/Lichens	na	10%	BL
Total understorey projective foliage cover		95%	

LF Code	Species typical of at least part of EVC range	Common Name
LH	v <i>Craspedia paludicola</i>	Swamp Billy-buttons
LH	<i>Villarsia reniformis</i>	Running Marsh-flower
MH	<i>Myriophyllum crispatum</i>	Upright Water-milfoil
MH	<i>Lythrum hyssopifolia</i>	Small Loosestrife
MH	<i>Centella cordifolia</i>	Centella
SH	<i>Neopaxia australasica</i>	White Purslane
SH	<i>Myriophyllum integrifolium</i>	Tiny Water-milfoil
LTG	<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass
LNG	<i>Baumea arthropphylla</i>	Fine Twig-sedge
MTG	<i>Schoenus tesquorum</i>	Soft Bog-sedge
MTG	<i>Triglochin alcockiae</i>	Southern Water-ribbons
MTG	<i>Notodanthonia semiannularis</i>	Wetland Wallaby-grass
MTG	<i>Austrodanthonia duttoniana</i>	Brown-back Wallaby-grass
MNG	<i>Eleocharis acuta</i>	Common Spike-sedge
MNG	<i>Hemarthria uncinata</i> var. <i>uncinata</i>	Mat Grass
MNG	k <i>Eleocharis macbarronii</i>	Grey Spike-sedge
MNG	<i>Triglochin striatum</i>	Streaked Arrowgrass

Recruitment:

Episodic/Flood. Desirable period between disturbances is 5 years.

Organic Litter:

10% cover

Appendix 3 – Example of Schematics for Growing Grass Frog Habitat Creation

